

PERMANENT INTERNATIONAL ASSOCIATION
OF
NAVIGATION CONGRESSES

REPORT
OF
PROCEEDINGS OF THE XIIth
CONGRESS

PHILADELPHIA

1912

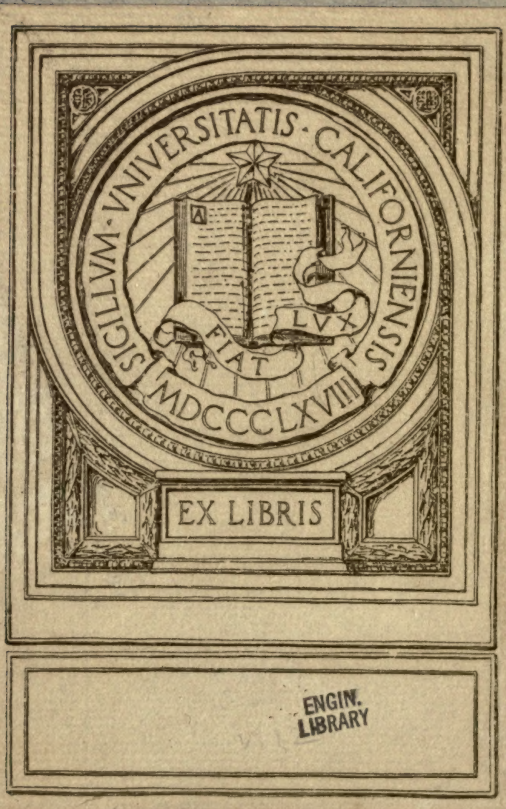


EXECUTIVE COMMITTEE
OFFICE OF THE GENERAL SECRETARY
38, RUE DE LOUVAIN, 38
BRUSSELS

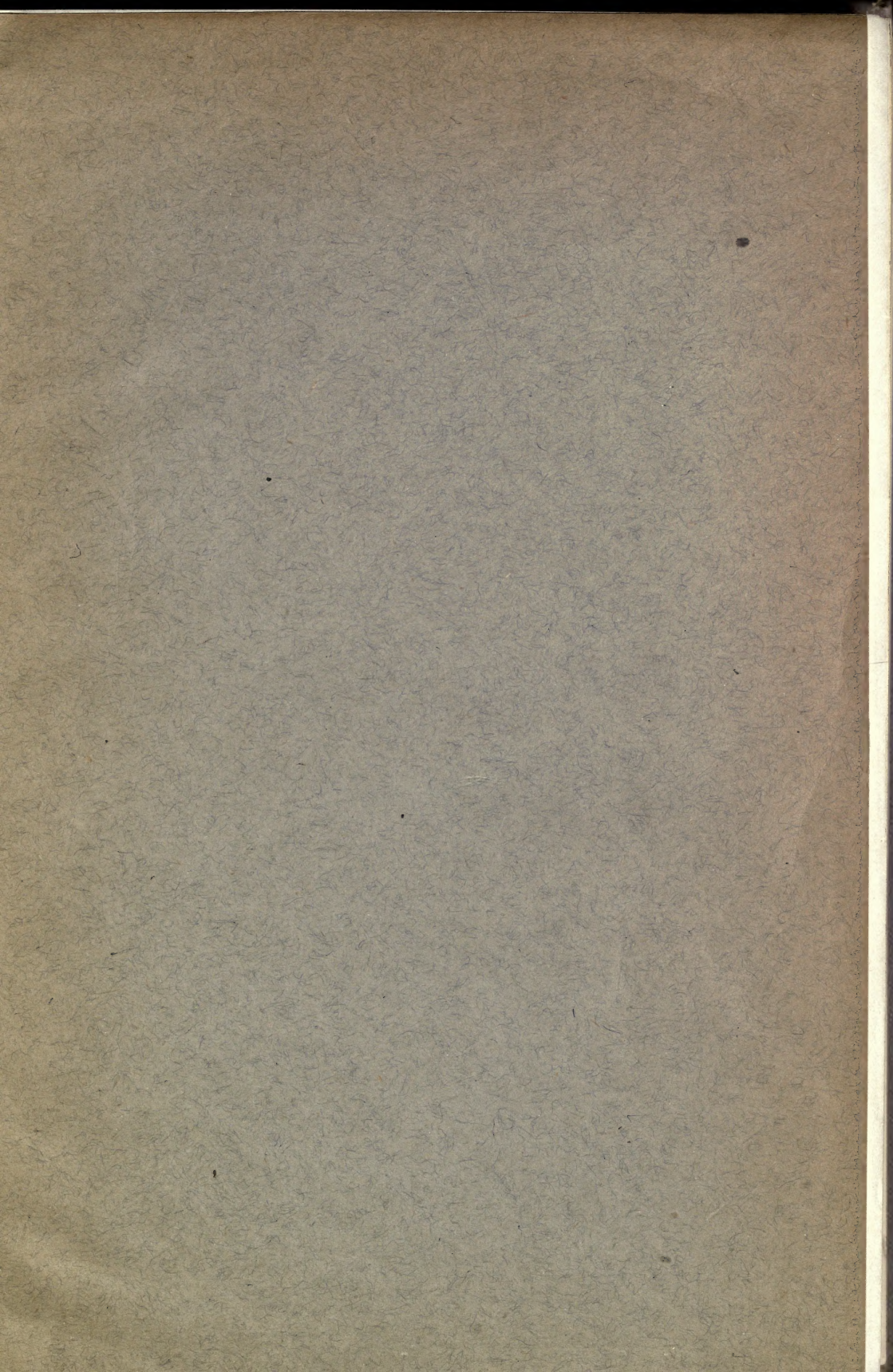
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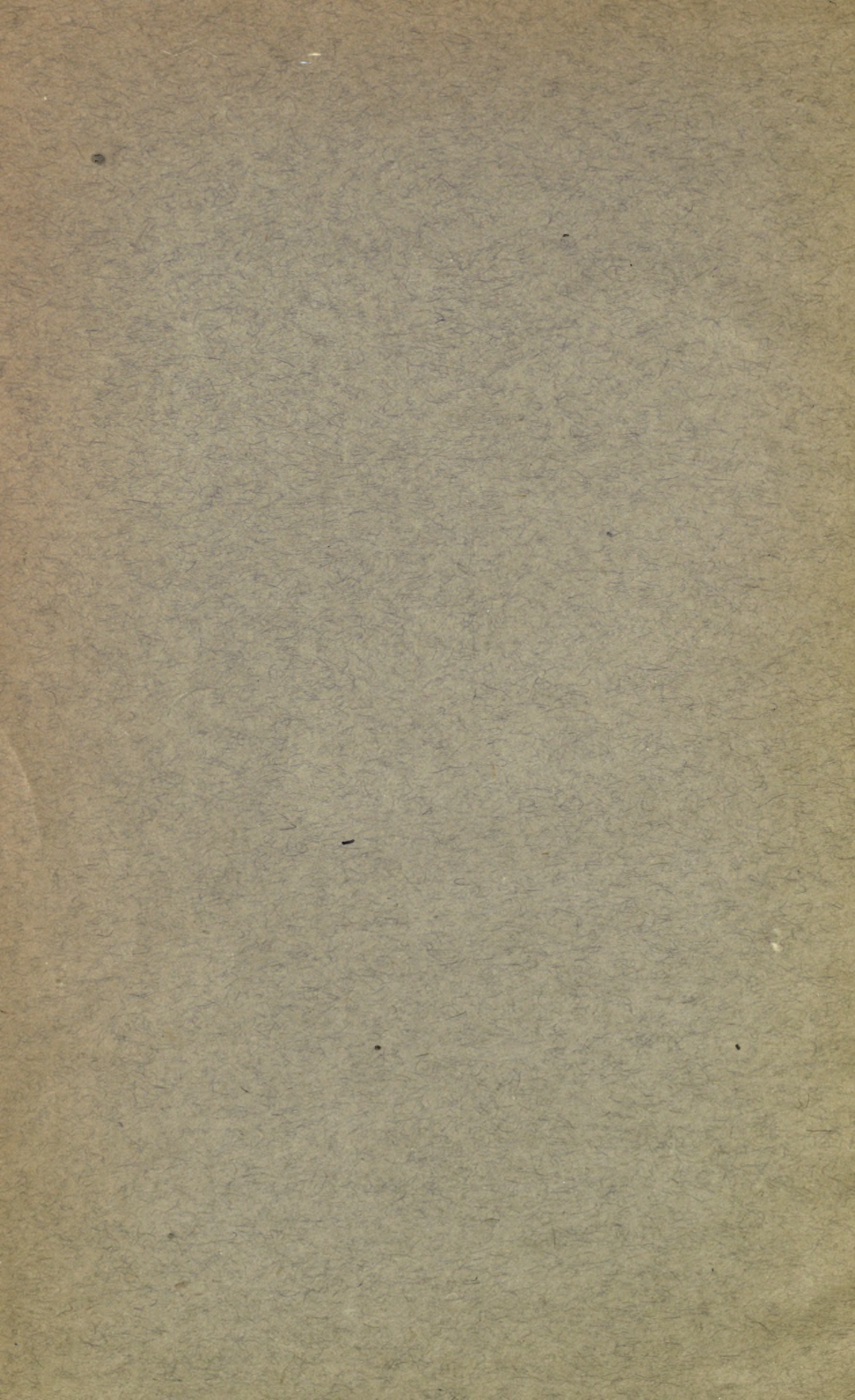


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REPORT

OF

PROCEEDINGS OF THE CONGRESS

BRUSSELS

SOCIÉTÉ ANONYME BELGE D'IMPRIMERIE
3, Rue du Ruisseau, 3

1913

HONORARY PRESIDENT OF THE CONGRESS



HIS EXCELLENCY WILLIAM H. TAFT

PRESIDENT OF THE UNITED STATES

12th, Philadelphia, 1912.

PERMANENT INTERNATIONAL ASSOCIATION

OF

NAVIGATION CONGRESSES

REPORT

OF

PROCEEDINGS OF THE XIITH CONGRESS

PHILADELPHIA 1912



EXECUTIVE COMMITTEE — OFFICE OF THE GENERAL SECRETARY

38, RUE DE LOUVAIN, 38

BRUSSELS

PERMANENT INTERNATIONAL ASSOCIATION

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NAVIGATION COMMISSION

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1912

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REPORT

PROCEEDINGS OF THE XIITH COMMISSION

PHILADELPHIA 1912

U. S. DEPARTMENT OF COMMERCE
BUREAU OF MARITIME SERVICE
WASHINGTON, D. C.



EXECUTIVE COMMITTEE - OFFICE OF THE GENERAL SECRETARY

20 RUE DE LOUVAIN, 20

BRUSSELS

THE
PENNSYLVANIA
LEGISLATURE

HONORARY VICE-PRESIDENT OF THE CONGRESS



HIS EXCELLENCY JOHN K. TENER

GOVERNOR OF PENNSYLVANIA

264275

INTRODUCTION

The XIIth International Navigation Congress was held in Philadelphia from the 23rd to the 28th May, 1912, under the high patronage of his Excellency The Hon. *William H. Taft*, President of the United States. This is the third Congress organised with conspicuous success by the Permanent International Association of Navigation Congresses, whose headquarters are at Brussels.

The success of the Navigation Congress is due to the collaboration of two bodies with distinct functions; one of these being the Permanent International Commission, which controls the whole Association, directs its actions and assumes responsibilities for these, seeks to increase its financial resources and widen the scope of its technical activities; and the other being the Local Organising Commissions which are appointed in the countries where the Congresses are held. The duration and functions of these Commissions are confined to one session of a Congress, and their duties lie principally in the special direction of arranging beforehand for the successful organisation and working of the forthcoming Congress.

Before dealing with the Congress of Philadelphia it may be of interest call to mind a few instances of the past.

In 1900 at the VIIIth International Navigation Congress held in Paris, Mr. *John A. Ockerson*, Member of the Mississippi River Commission gave a lecture on the important works being carried out in the United States, and Colonel *Millis* expressed the hope at the closing meeting of the Congress that the IXth International Navigation Congress should be held in the United States in the near future. This proposal could not be carried out immediately despite the unceasing efforts of our American colleagues and particularly of engineer *Corthell*.

In his speech at the closing meeting of the Düsseldorf Congress in 1902, Brigadier General *Raymond*, U. S. Army, invited us to

come to America, where he promised we should be received with open arms. This invitation was in a sense a confirmation of the promises held out in 1900.

In the meantime the Permanent International Association of Navigation Congresses was constituted, and its first Congress was held in Milan, 1905, with conspicuous success.

Three years later the Association held its session at St.-Petersburg with the aid of Messrs. *Guercevanoff* and *de Timonoff*, chiefs of the Russian delegation, and the memory of this magnificent Congress is still present in the minds of all those who took part in it.

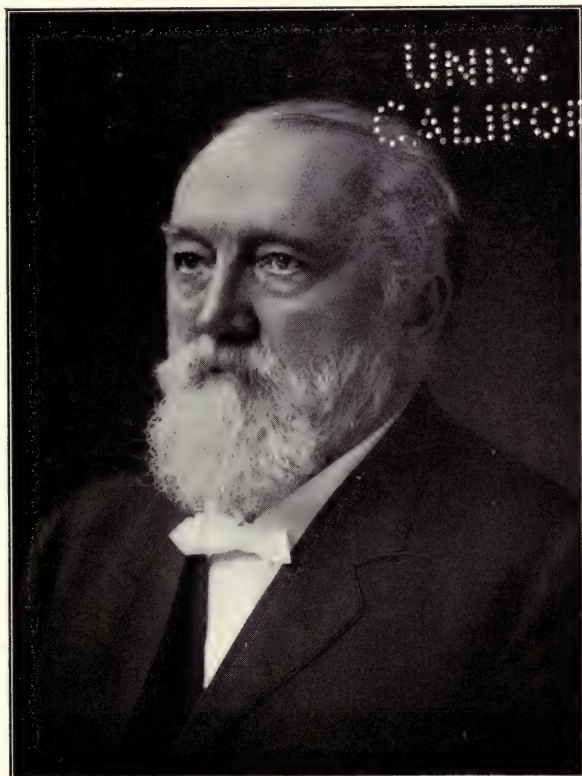
Eleven Navigation Congresses, excluding the « fluvial » Congress of Paris, (1889) and the « maritime works » Congresses of Paris, (1889) and London, (1893) had been held in Europe. But the Association aspired to international honours, and desired to hold a meeting across the ocean in the New World. Many attempts and much influence were required to achieve this object, but the official delegates of the United States spared no pains and neglected no opportunities to accomplish their ends.

Towards the close of the 1909 session of the United States Congress, the Hon. *J. Hampton Moore*, representative in Congress of Philadelphia, and permanent member of the Association, secured the passage in the Lower House of Congress of a bill authorising an official invitation to the Association to hold its next Congress in the United States, but on account of the extreme shortness of the time remaining before the date of adjournment, as provided by the United States Constitution, it was impossible to secure the passage of this measure by the Upper House.

Fortunately, at the next meeting of the Permanent Commission in Brussels, May 17th, 1909, it was decided to postpone the date of holding the XIIth International Navigation Congress from 1911 to 1912, and the decision as to place of meeting was also postponed until the Commission should meet in 1910.

A renewed effort was thereupon made to induce Congress to authorise the official invitation. Through the strong interest taken in this matter by Hon. *De Alva S. Alexander*, Member of Congress and Chairman of the Committee on Rivers and Harbours of the House of Representatives, warmly seconded by the Hon. *J. Hamp-*

HONORARY VICE-PRESIDENT OF THE CONGRESS



HON. RUDOLPH BLANKENBURG

MAYOR OF PHILADELPHIA

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ton Moore, a provision authorising the invitation and making a liberal appropriation for the expenses of the Congress, was inserted in the Act making appropriations for the improvement of Rivers and Harbours, which was passed by both houses of Congress and approved by the President of the United States.

The city in which it was proposed to hold the XIIth Congress was not named in the Act. Shortly afterwards the United States Section of the Permanent International Commission recommended to the Government that « Philadelphia » should be selected as the proposed place of meeting, and that it should be mentioned in the official invitation. This invitation was presented at the meeting of the Commission, July 30th, 1910, and was warmly seconded by His Excellency Mr. *Fielding*, Minister of Finance of Canada, who expressed a desire that the members of the Association should also visit the Dominion; and it was accepted with a heartiness that was greatly appreciated by the American members.

At the same meeting the programme of « Questions » and « Communications » to be considered at the Congress was decided upon.

The formation of a suitable organisation in the United States to prepare for and conduct the Congress in cooperation with the Executive Committee of the Association was at once undertaken. As the United States Section of the Permanent Commission had in 1903, by authority of the Secretary of War, been constituted a Board to consider for that country all questions which from time to time might arise in connection with the Association and the Congress, it was decided to entrust the general conduct of the work to that Section. This Section, provided with these powers and with the administration of the funds voted by Parliament, was henceforth designated as the « *General Organising Commission* ». On the other hand the details of the reception, at Philadelphia, including the opening meeting of the Congress and the local excursions to be given in the vicinity of Philadelphia, were to be controlled by a « *Local Organising Commission* ».

Two general Presidents of the Congress were chosen, Brigadier General *C. W. Raymond*, U. S. Army, Retired, and Brigadier General *W. H. Bixby*, Chief of Engineers, U. S. Army. Two Presidents of the First Section were appointed : Colonel *John Bogart*, Consulting Engineer, and Mr. *Alfred Noble*, Consulting

Engineer. Two Presidents of the Second Section were appointed: Mr. *E. L. Corthell*, Consulting Engineer, and Colonel *H. F. Hodges*, Corps of Engineers, U. S. Army, and a General Secretary, Lieut-Colonel *J. C. Sanford*, Corps of Engineers, U. S. Army. The Hon : *J. Hampton Moore*, Member of the United States Congress was chosen as President of the Local Organising Commission, and was requested to take the necessary steps towards the formation of this Commission.

With a view to arousing widespread interest in the Congress at Philadelphia, the Local Organising Commission was made unusually large, and was afterwards sub-divided into thirteen Committees to carry out the several purposes indicated by their respective titles. In addition an Auxiliary Committee of Ladies was appointed to provide for the entertainment of the lady members of the Congress. The work of all these Committees was controlled by an Executive Committee composed of the Chairmen and Vice-Chairmen of the Committees.

With a view to ensure the technical success of the Congress, the Executive Committee of the Association undertook for its own part to select the Reporters. The necessary steps to effect this were taken in Belgium as far back as the 14th September, 1910, whilst the aid of the chiefs of the delegations of the various countries, represented on the Permanent Commission, was invoked by a special circular letter. The appeal of the Executive Committee was not in vain, and the consent of the Reporters was sent in without delay. In addition to the ordinary Reporters, the American representatives appointed 13 general Reporters.

During the month of December, 1910, the Executive Committee was advised, this time by diplomatic channel, that the Government of the United States officially invited the Permanent International Association of Navigation Congresses to hold its XIIth Congress at Philadelphia, in 1912. That Government then applied to all the Governments which patronise the Association, to appoint as many and as important official delegations as possible.

A circular letter, dated the 26th January, 1911, was sent by the Executive Committee to the Members of the Permanent Commission, acquainting them with the intentions of the American Government. This circular letter expressed the wish that all the Govern-

ments should accede to the invitation of the United States in order to enhance the importance of the Congress of Philadelphia. These expectations were realised, as one will see by glancing through the list of official Government delegates which is printed at the beginning of this publication.

The Organising Commissions first proceeded to arrange the propaganda for the Congress. They came to an understanding on this point with the Secretarial Department of the Association, and distributed broadcast in all countries a preliminary circular in English, French and German, giving general information on the Congress and its programme, a list of Reporters, proposed excursions, conditions of Membership of the Congress, etc. This preliminary circular was followed by monthly Bulletins issued under the auspices of the Organising Commissions setting forth particulars of accommodation at Philadelphia, advice regarding the sea journey, transport of luggage, proposed excursions during and after the Congress, and giving the names of Societies and Clubs prepared to receive the Members of the Congress.

The Organising Commissions also distributed illustrated pamphlets and geographical maps of the United States to the members of the Association. Through the courtesy of Transportation Companies, Municipalities, and Commercial Companies, a large number of their illustrated publications were also distributed in this manner. Some of these publications were certainly issued with a view to advertisement, but their excellent maps and half-tone illustrations provided the most useful and interesting information. One of these pamphlets, describing Duluth and the "Iron Ranges" of Minnesota, was specially edited by the Companies interested in those industries for distribution to the members of the Association.

All these publications were greatly appreciated by the members, as they dealt with the great country in which the XIIth Congress was about to be held.

* * *

Towards the end of 1911, a Committee of the Local Organising Commission, consisting of its President, the President of the Committee of Patrons, Judge *Dinner Beeber*, and a few other

notabilities, approached His Excellency the Hon. *William H. Taft*, President of the United States, and solicited his high patronage for the proposed Navigation Congress. This Committee was cordially received by President *Taft*, who expressed the greatest interest in the work of the Association, and not only acceded to their request but also notified his willingness to open the Congress in person. He was subsequently elected Hon: President of the Congress, a post which he accepted. At the same time the Hon: *John K. Tener*, Governor of Pennsylvania, and the Hon: *Rudolph Blankenburg*, Mayor of Philadelphia, were elected honorary Vice-Presidents of the Congress.

The list of patrons of the Congress includes the names of the most distinguished navigation experts of the United States and Canada, as one will see on glancing through the list printed in the first part of this publication.

The date of the Congress was definitely fixed in December, 1911, and announced by the following cable from the American Commission :

"Internaute, Brussels.

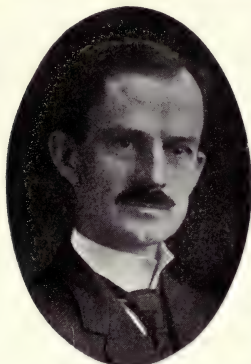
"President Taft will open Congress May 23rd, 1912,
Sanford."

Immediately on receipt of this cablegram, the Executive Committee of Brussels acquainted the members of the Permanent International Commission and the members of the Association with its contents. From this moment a large number of promises to attend the Congress were received from all parts.

*
* *

The number of ordinary reporters appointed was at first 106; but this number was subsequently reduced to 100 owing to withdrawals. If we add to this figure the 13 general reports we arrive at the very large total of 113 reports, published in the three languages of the Association, and representing about 7000 pages of text and 520 plates of illustrations. Although the printing was considerable it was accomplished within the regulation time, or in

mission

A black and white portrait of a man with a mustache, wearing a suit and a bow tie. The portrait is oval-shaped and appears to be a reproduction of a photograph.

A black and white portrait of a man with a mustache, wearing a military uniform with a high collar and epaulettes. The portrait is oval-shaped and set against a dark background.

A black and white oval portrait of a man with a mustache, facing right. The man has dark hair and is wearing a dark suit jacket over a light-colored shirt and a dark tie. The portrait is set against a light background.

A black and white oval portrait of a man with a prominent mustache, wearing a dark suit, white shirt, and patterned tie. The portrait is set against a dark background.

A black and white oval portrait of a man with short, light-colored hair, looking directly at the camera with a neutral expression. He is wearing a dark U.S. Navy uniform jacket with a white shirt and a dark tie. The letters "U.S." are visible on the left side of his collar. The portrait is set against a dark background.

COLONEL HARRY F. HODGES
U. S. Army

1881
AMERICAN

other words, sufficiently in time for the complete set of reports to be sent to all the permanent members of the Association, and to the temporary members of the Congress before the opening of the Congress. The task of the General Secretary of the Association was facilitated by the co-operation of the reporters, most of whom were good enough to send the manuscript of their papers in triplicate. Eighty-three reporters sent in their reports within the eight months stipulated by the regulations.

The Executive Committee has great pleasure in taking this opportunity of acknowledging its indebtedness to all the reporters, (ordinary and general,) for their co-operation with the Association in contributing to the technical success of the Congress.

* * *

As the Presidents of the Association were prevented from attending the Philadelphia Congress, they suggested to the Permanent International Commission that *Mr. de Timonoff*, the oldest member of the Commission, who had presided with such success over the local Commission of the last Congress at St. Petersburg, should take their place as acting president.

This selection was unanimously approved by the members of the Commission, and *Mr. de Timonoff* placed himself at the disposal of his colleagues in the most laudable manner.

Mr. de Timonoff, *Mr. Richald*, General Secretary of the Association, and the members of the Congress, were received by the delegates of the Reception Committee on their arrival at New York, and by *Mr. and Mrs. Corthell*, who did everything to make the sojourn of the members of the Association agreeable to them.

The opening ceremony took place on May 23rd, 1912, in the Opera House, Philadelphia, the internal decoration of which was much admired. Sectional meetings, and the general closing meeting (28th May), were held on the first floor of the Hotel Bellevue-Stratford, in its luxuriously furnished rooms.

A "Congress Journal" edited by the American Commission, was published daily, so as to keep the members of the Congress posted as to the work which was being done during the session.

The minutes of Proceedings of the meetings are reproduced in extenso in this publication.

An illustrated description of the State of Pennsylvania, printed in three languages, and a similar but less important work dealing with the City of Philadelphia, were distributed during the Congress, and subsequently posted to those permanent members who had been unable to attend.

Other publications were distributed during the Congress and during the excursions, describing the places visited and their important buildings.

A certain number of copies of a beautifully illustrated work on Canada, published under the auspices of the Department of Marine and Fisheries, were placed at the disposal of the members of the Congress.

The Organising Commissions had decided not to hold an Exhibition in conjunction with the Congress, but as the Panama Canal, the greatest engineering work in course of construction in America, was so far off that probably few members would be able to visit it, it was considered desirable to show detailed models of this work. Thanks to the courtesy of Colonel *Geo. Goethals*, Chief Engineer of the Canal, and Colonel *H. F. Hodges*, Chief Assistant-Engineer, and Member of the General Organising Commission of the XII th Congress, some very interesting models and maps in relief were sent to Philadelphia, and exhibited in its Commercial Museum during the Congress. All possible information was given regarding these models and maps by an engineer from the Canal Commission who had been specially detailed for this purpose. A large number of other models, drawings etc., on permanent exhibition, were also shown to the members of the Congress in the Commercial Museum.

The Exhibition Committee subsequently received and exhibited for the advantage of the Members of the Congress, some further plans and models of the canal works in the State of New York, (Barge canal,) and also the complete plans for the improvement works of the city of Philadelphia, and of its maritime plant. Several lectures were given in the Museum during the Congress, for the benefit of the members.

Executive Committee and Members of the Local Organizing Commission



Seated : JAMES B. BONZER, HON. DIMNER BEEBER, GEORGE F. SPROULE, WILLIAM T. TILDEN, HON. J. HAMPTON M. JOSE,
J. S. W. HOLTON, FRANK D. LALLANNE, LIEUT. COL. J. C. SANFORD, U. S. A., THEODORE KOLISCHER.

Standing : HORACE A. DOAN, COLEMAN SELLERS JR., MURDOCK KENDRICK, HERBERT F. STETSER, JOSEPH F. HASSKARL,
SAMUEL L. KENT, WILLIAM H. HOLLIAR, WILLIAM O. HEMPSTEAD, WILFRED H. SCHOFF, N. B. KELLY, GEORGE W. NORRIS, GEORGE E. BARTOL.

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Receptions and Excursions.

As the Congress was to be held in a country very distant from the native lands of most of the Members of the Congress, the General and Local Organising Commissions decided to organise a series of receptions and interesting excursions, so as to render the sojourn of the members of the Congress in the United States as agreeable and as profitable as possible. The Organising Commissions were fortunately able to raise the necessary funds for this purpose. The City of Philadelphia, honoured by being chosen as the place of meeting of the Congress, made a generous appropriation for these purposes, and the State of Pennsylvania, desiring that the members should see that State quite thoroughly and be well informed regarding it, also contributed liberally. The City of Pittsburgh, the State of New Jersey, the City of New York, the Boston, Cape Cod and New York Canal Company, and various important organisations in Boston also contributed to the funds.

The necessary funds for the entertainment of the members at Buffalo, Cleveland, Detroit, Milwaukee and Chicago were also secured through the excellent work of the Local Commissions which the General Organising Commission had appointed at the respective cities. The Government of the Dominion of Canada showed much interest in the Congress, inviting the members to take part in a most interesting and extensive trip in that country, for which also a generous appropriation was made.

Through these arrangements, numerous entertainments for the members and their ladies were provided at Philadelphia, as well as four local excursions in the vicinity of that city. These took place on May 24th and 26th, two alternative excursions being arranged for each day. On the night of the 28th, after the closing session of the Congress, the members were taken to Washington, Harrisburg and Pittsburgh, returning to Philadelphia on the morning of June 2nd.

The 3rd of June was devoted to an agreeable journey through the State of New Jersey, which had been arranged by a Commission appointed for this purpose by the Government of the State. On the evening of that day the members of the Congress were received in New York by the American Society of Civil Engineers

under the Chairmanship of *Mr. John A. Ockerson*. On the 4th and 5th June the members visited the sights of New York and its suburbs, in accordance with a programme which had been carefully arranged by this Society. Many members left New York on the evening of the 4th June for Boston, via the Cape Cod Canal, and on arrival at Boston on the afternoon of the 5th they were entertained by a Local Committee until a very late hour in the evening of the 6th. The other members who were to remain at New York embarked on the June 6th, on a special steamer to go up the Hudson river as far as Albany, after a brief stop at West Point. On the morning of the 7th, these members were joined by those coming from Boston, and the two groups then proceeded by special train to visit the important works of the New York State Barge Canal, and on the afternoon of the 8th June they arrived at Buffalo. Here again a Local Committee welcomed the members of the Congress in a brilliant manner. The latter visited the Niagara Falls and Rapids on the afternoon of the 9th. On the evening of the 9th they left Buffalo on board the "Northland", a steamer which had been specially chartered for them, and arrived on the morning of the 10th at Cleveland, where a varied programme of receptions had been arranged in their honour. A brief stay was made on the following day to visit the improvement works at the mouth of the Detroit, and at 9 a. m. the members disembarked at Detroit, where they were received by the Mayor, and by a Local Committee which had been appointed to show them the sights of the town. The party left Detroit in the afternoon of that day, and arrived at Sault-Ste-Marie, after a crossing of about 22 hours. They were very much interested in that place, and in the remarkable locks which have been built by the United States on one bank of the river and by Canada on the other bank, for facilitating navigation between Lake Superior and Lake Huron. After visiting these engineering works, those members who desired to take part in the trip organised by the Canadian Government, left the "Northland" for good, whilst the steamer continued its journey with the other members to Milwaukee, where it arrived in the afternoon of the 13th June. Various excursions had been arranged in that city for the benefit of the members. On the following morning they visited the enormous works of the United States Steel Corporation, (Steel Trust)

at Gary, Indiana, and in the afternoon they disembarked at Chicago their ultimate destination, where they remained until the evening of June 15th. Those who took part in the Canadian excursion left Sault-Ste-Marie by boat, and continued their journey by rail to Toronto, where a Local Committee of the Canadian Society of Civil Engineers entertained them during 24 hours. The party left Toronto by water on the afternoon of the 14th, and disembarked at Prescott, (below the Thousand Islands of the St. Lawrence,) in the morning of the 15th, and then travelled by rail to Ottawa, where an attractive programme of receptions had been arranged for them. On the morrow they went by train as far as the landing stage of Coteau, on the St. Lawrence, and thence by boat to Montreal, visiting en route the lower lock of the Soulanges canal. They stayed at Montreal from the 16th to the 18th, during which time they were agreeably entertained by several magnificent excursions. The 18th June was devoted to a last journey by steamer from Montreal to Quebec, where the party broke up after a stay of about 24 hours.

All the receptions and excursions are described in detail at the end of the report of proceedings of this Congress.

The excursions were exceptionally long, but in order to enable the members of the Congress to appreciate the engineering works and navigable waterways of the United States and Canada, it was indispensable to make them long. It is with this object that the vast programme of excursions in which the members took part was elaborated, and the successful way in which it was carried out redounds to the credit of the organisers of the Congress. The Association can never congratulate or thank them enough for this.

Conclusions.

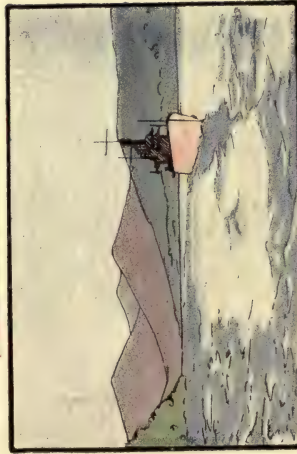
The XIIth International Navigation Congress, apart from its undeniable success, has helped to make the Association better known and more appreciated throughout the vast territory of the United States. Important Corporations and permanent American members have joined the Association in such numbers that their country, thanks to the total amount of its subscription, now heads the list

of nations which patronise the Association. At the commencement of the year 1909 the American members were 87 in number; to-day they are 437, including 32 corporations which pay 100 Frs. and over per annum.

The Association continues its triumphal march whilst preserving its beautiful traditions of science and progress. It has drawn forth, on the occasion of the Philadelphia Congress, an imposing collection of reports which are the results of the most recent investigations of the most competent hydraulic engineers throughout the world. The "conclusions" voted by the Congress are an excellent record of resolutions and opinions, which may well serve as a guide for all those who have charge of important hydraulic works.



PERMANENT
INTERNATIONAL
ASSOCIATION
OF
NAVIGATION
CONGRESSES



AS IT WILL APPEAR WHEN COMPLETED



THE PANAMA CANAL BEFORE WORK BEGAN

·NAVIGARE·
·NECESSE·

XIITH CONGRESS
PHILADELPHIA
1912

UNIV. OF
CALIFORNIA

GENERAL INFORMATION

XIth INTERNATIONAL CONGRESS OF NAVIGATION

held in PHILADELPHIA in 1912

UNDER THE HIGH PATRONAGE

OF

HIS EXCELLENCY WILLIAM H. TAFT

PRESIDENT OF THE UNITED STATES

HONORARY PRESIDENT :

S. E. William H. TAFT,

President of the United States.

HONORARY VICE PRESIDENTS

Hon. John K. TENER,

Governor of Pennsylvania.

Hon. Rudolph BLANKENBURG,

Mayor of Philadelphia.

COMMITTEES

Committee on Patrons

- Hon. Philander C. **Knox**, Secretary of State.
Hon. Franklin **MacVeagh**, Secretary of the Treasury.
Hon. Henry L. **Stimson**, Secretary of War.
Hon. Geo. V. L. **Meyer**, Secretary of the Navy.
Hon. Walter L. **Fisher**, Secretary of the Interior.
Hon. Charles **Nagel**, Secretary of Commerce and Labor.
Hon. John Douglas **Hazen**, Minister of Marine and Fisheries of Canada.
Hon. Charles J. **Bonaparte**, Ex-Attorney-General of the United States.
Hon. Charlemagne **Tower**, Ex-Ambassador to Germany.
Hon. Simeon E. **Baldwin**, Governor of Connecticut.
Hon. Albert W. **Gilchrist**, Governor of Florida.
Hon. James H. **Hawley**, Governor of Idaho.
Hon. Chase S. **Osborne**, Governor of Michigan.
Hon. Herbert S. **Hadley**, Governor of Missouri.
Hon. Edwin L. **Norris**, Governor of Montana.
Hon. Lee **Cruce**, Governor of Oklahoma.
Hon. Aram J. **Pothier**, Governor of Rhode Island.
Hon. O. B. **Colquitt**, Governor of Texas.
Hon. John A. **Mead**, Governor of Vermont.
Hon. William **Hodges Mann**, Governor of Virginia.
Hon. Wm. E. **Glasscock**, Governor of West Virginia.
Hon. J. M. **Carey**, Governor of Wyoming.
Hon. Theodore E. **Burton**, U. S. Senator from Ohio.
Hon. Moses E. **Clapp**, U. S. Senator from Minnesota.
Hon. Jacob H. **Callinger**, U. S. Senator from New Hampshire.

- Hon. De Alva S. **Alexander**, Former Member of Congress and Chairman, Rivers and Harbors Committee.
- Hon. Joseph S. **Ransdell**, Member of Congress from Louisiana and President National Rivers and Harbors Congress.
- Hon. Reuben O. **Moon**, Member of Congress from Pennsylvania.
- Hon. Chas. G. **Edwards**, Member of Congress from Georgia.
- Hon. Wm. E. **Humphrey**, Member of Congress from Washington.
- Hon. Michael **Donohue**, Member of Congress from Pennsylvania.
- Hon. George W. **Taylor**, Member of Congress from Alabama.
- Hon. James H. **Davidson**, Member of Congress from Wisconsin.
- Hon. John H. **Small**, Member of Congress from North Carolina.
- Hon. Chas. C. **Duryea**, Mayor of Schenectady, New York.
- Hon. Hiram H. **Edgerton**, Mayor of Rochester, New York.
- Hon. Wm. B. **Thompson**, Mayor of Detroit, Michigan.
- Hon. Emil **Seidel**, Mayor of Milwaukee, Wisconsin.
- Hon. Wm. A. **Magee**, Mayor of Pittsburgh, Pennsylvania.
- Hon. John F. **Fitzgerald**, Mayor of Boston, Massachusetts.
- Hon. Martin **Behrman**, Mayor of New Orleans, Louisiana.
- Hon. Wm. S. **Jordan**, Mayor of Jacksonville, Florida.
- Hon. James J. **Cuerin**, Mayor of Montreal, Canada.
- Hon. George R. **Ceary**, Mayor of Toronto, Canada.
- Hon. Cuno H. **Rudolph**, Commissioner, District of Columbia.
- Major W. V. **Judson**, Corps of Engineers, U. S. Army, Commissioner District of Columbia.
- Hon. Henry W. **Hill**, President, New York State Waterways Association.
- Mr. George W. **Norris**, Director Department of Wharves, Docks and Ferries, Philadelphia, Pa.
- Mr. Calvin **Tomkins**, Commissioner of Docks and Ferries, New York, N. Y.
- Hon. George **Clinton**, Chairman Executive Committee of the Barge Canal Terminals Conference of the State of New York.
- Hon. J. A. **Bensel**, State Engineer and Surveyor of the State of New York.
- Hon. Henry B. **Herbert**, President Canal Association of Greater New York.
- Mr. James A. **Farrell**, President United States Steel Corporation.

- Col. Geo. W. **Coethals**, Corps of Engineers, U. S. Army, Chairman Isthmian Canal Commission and Chief Engineer Panama Canal.
- Mr. Charles Henry **Rust**, City Engineer, Toronto, Canada.
- Mr. James **McCrea**, President Pennsylvania Railroad Company.
- Mr. George W. **Stevens**, President Chesapeake & Ohio Railway Company.
- Mr. Bernard N. **Baker**, President Atlantic & Pacific Transport Company.
- Mr. E. E. **Olcott**, President Hudson River Day Line.
- Mr. Henry S. **Grove**, President Wm. Cramp & Sons Ship & Engine Building Company.
- Mr. Wm. G. **Coxe**, President Harlan & Hollingsworth Corporation.
- Rear Admiral Mordecai T. **Endicott**, U. S. Navy, Retired, Past President American Society of Civil Engineers.
- Mr. Gano **Dunn**, President American Institute of Electrical Engineers.
- Mr. E. R. **Carhart**, President New York Produce Exchange.
- Mr. Edgar C. **Felton**, President Pennsylvania Steel Company.
- General **Coleman du Pont**, President E. I. du Pont de Nemours Powder Company.
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| I. Brussels 1885 | Cobert , Ingénieur honoraire des Mines, Bruxelles. |
| II. Vienna 1886 | X..., |
| III. Frankfort 1888 | Lindley (Sir William H.), M. Inst. C. E., Civil Engineer, Frankfort-on-Main; |
| IV. Manchester 1890 | Marshall Stevens , F. S. S., Manchester; |
| V. Paris 1892 | Barlatier de Mas (Fernand), Inspecteur général des Ponts et Chaussées en retraite, ancien Professeur à l'Ecole Nationale des Ponts et Chaussées, Lyon; |

- V I. The Hague 1894 **Asser** (E.-L.), Ingénieur en chef des Chemins de fer hollandais (décédé);
- VII. Brussels 1898 **Dufourny** (Alexis), Inspecteur général des Ponts et Chaussées, Bruxelles;
- VIII. Paris 1900 **Pavie** (Georges), Ingénieur en chef des Ponts et Chaussées, Paris;
- IX. Dusseldorf 1902 **Symphér** (Léo), Geheimer Oberbaurat, Vortragender Rat im Ministerium der öffentlichen Arbeiten, Berlin;
- X. Milan 1905 **Sanjust di Teulada** (E.), Inspecteur supérieur du Génie civil, Président de la Soc. des Ingénieurs et Architectes italiens, Député au Parlement, Rome;
- XI. St-Petersburg 1908 **de Timonoff** (V.-E.), Ingénieur des Voies de Communication et des Constructions civiles, Conseiller privé, Professeur à l'Institut des Ingénieurs des Voies de Communication, Membre du Conseil des Ingénieurs et Directeur de la Statistique et de la Cartographie, au Ministère des Voies de Communication, Membre du Conseil technique au Ministère du Commerce et de l'Industrie, Membre du Conseil statistique de l'Empire, Président du Comité hydrologique, Saint-Pétersbourg.
- XII. Philadelphia 1912 **Sanford** (J.-C.), Lieut.-Colonel Corps of Engineers, U. S. Army, Detroit, Mich.

Members :

Algeria

Boulogne (G.), Directeur des Travaux Publics et des Mines au Gouvernement général de l'Algérie, Conseiller rapporteur, Alger.

Argentine (Republic)

Bustos Moron (H.), Ingénieur, Buenos-Aires;

Speluzzi (Emilio), Ingénieur en chef, Ministère des Travaux publics, Buenos-Aires.

Austria-Hungary

Austria

Russ (Dr. Viktor), K. K. Geheimer Rat, Exzellenz, Mitglied des Oesterreich. Herrenhauses, Praesident der Oesterr. Nordwest-Dampfschiffahrt-Gesell., Wien.

Kautzky (Dr. Heinrich), Sektionsrat, Leiter des Binnenschiffahrts-Departements im k. k. Handelsministerium und Vorstand der Administrativen Abteilung der Direktion für den Bau der Wasserstrassen, Wien;

Kuhn (Richard), K. K., Hofrat, Vorstand des Hydrotechnischen Bureaus im K. K. Handelsministerium, Wien I.

Hungary

de Kvassay (Eugène), Conseiller ministériel, Chef de la Direction royale hongroise des Eaux, Ministère de l'Agriculture, Budapest;

Hoszpotsky (Aloyse), Conseiller ministériel au Ministère du Commerce, Budapest.

Belgium

Lagasse de Loch (Charles), Directeur Général des Ponts et Chaussées, Bruxelles;

Pierrot (Jean, Arnold), Inspecteur Général des Ponts et Chaussées, Directeur Général des Voies Hydrauliques, Bruxelles;

Vanderlinden (Jean, Florimond), Inspecteur général des Ponts et Chaussées, Administrateur-Inspecteur de l'Université de Gand, Gand;

Van Cansberghe (Louis), Inspecteur Général des Ponts et Chaussées, Bruxelles ;

Mailliet (Toussaint, Valérie), Directeur général honoraire des Ponts et Chaussées, Bruxelles;

Troost (J.-L.), Directeur général honoraire des Ponts et Chaussées, Bruxelles;

Lambin (Albert), Ingénieur en chef Directeur des Ponts et Chaussées, Chef du Cabinet du Ministère de l'Agriculture et des Travaux publics, Bruxelles.

Brazil

de Oliveira Lima (Manuel), Envoyé Extraordinaire et Ministre Plénipotentiaire, Bruxelles;

de Silveira Bulcao (José, Fortunato), Consul général, Anvers.

Bulgaria

Morfoff (B.), Ingénieur, Directeur général des Chemins de fer de l'Etat Bulgare, à Sofia.

Canada

Hon. **Hazen** (John Douglass), Ministre de la Marine et des Pêcheries du Canada, Ottawa.

Canal maritime de Suez (Compagnie Universelle)

Quellenec, (E.), Ingénieur en chef des Ponts et Chaussées, Ingénieur-Conseil de la Compagnie du Canal de Suez, Paris.

Chili

Lindor Perez (G.), Admiral, Chief of the Chilian Naval Commission, Londres.

China

X..., Secrétaire de la Légation de Chine, Bruxelles.

Danube (Com. Europ.)

President of the Commission (The German or French Delegate).

Denmark

Westergaard (Viggo), Directeur des Travaux Maritimes de l'Etat Danois, Copenhague.

France

Charguéraud (André), Conseiller d'Etat, Inspecteur général des Ponts et Chaussées, Directeur des Routes et de la Navigation au Ministère des Travaux Publics, Paris;

Cuérard (M.-N. Adolphe), Inspecteur général des Ponts et Chaussées, Paris ;

Juncker, Inspecteur général des Ponts et Chaussées en retraite, Paris;

Résal, Inspecteur général des Ponts et Chaussées, Paris;

Crahay de Franchimont (Henri), Inspecteur général des Ponts et Chaussées, Paris;

de Joly (Georges), Ingénieur en chef des Ponts et Chaussées, Professeur à l'Ecole Nationale des Ponts et Chaussées, Paris ;

Dabat, Directeur général des Eaux et Forêts au Ministère de l'Agriculture, Paris;

Mallet (Paul Alfred), Ingénieur des Arts et Manufactures, Membre de la Chambre de Commerce de Paris;

Reumaux, E., Ancien Président de la Société des Ingénieurs civils de France, Directeur général de la Soc. des Mines de Lens, Membre du Syndicat de la Marine (Navigation Intérieure), Lens (Pas-de-Calais);

Fougerolles, Ancien Président du Syndicat professionnel des Entrepreneurs de Travaux publics de France, Paris.

Germany

Freiherr Franz von Coels von der Brügghen, Unterstaatssekretär im Ministerium der öffentlichen Arbeiten, Berlin;

von Dœmming (Albert), Ministerial- und Oberbaudirektor im Ministerium der öffentlichen Arbeiten, Berlin;

Krause (Dr.), Geheimer Justizrat, Zweiter Vizepräsident des Preussischen Hauses der Abgeordneten, Berlin;

von Schuh (Georg), Dr. Jur, Oberbürgermeister, Kgl. Geheimer Rat, Nurnberg;

Bubendey (J. F.), Wasserbaudirektor der Freien und Hansestadt Hamburg, Geheimer Baurat, Hamburg;

Flaisch, Wasserbautechnischer Referent im Ministerium für Elsass-Lothringen, Strassburg;

de Thierry (Georg), Geheimer Baurat, Professor an der Techn. Hochschule, Membre de la Commission consultative du Canal de Suez, Berlin-Halensee;

Engels (Hubert), Geheimer Hofrat, Professor, Dresden;

Heineken, Vorsitzender des Direktoriums des Norddeutschen Lloyds, Bremen;

Lutjohann, Kaiserlicher Regierungsrat, Kiel.

Great Britain

Sir **Cecil Hertslet**, Consul général de S. M. Britannique en Belgique, Anvers;

Yorke (H. A.), Lieutenant-Colonel, Inspecteur en chef des Chemins de fer, Londres.

Greece

Embiricos, ancien Ministre de la Marine, Athènes;

Typaldo-Bassia, Ancien Président intérimaire du Parlement, Membre de la Cour internationale permanente d'Arbitrage, Athènes.

Indo-China

Boutteville (X.), Inspecteur général des Ponts et Chaussées, Inspecteur général des Travaux Publics des Colonies, Paris.

Italy

Torri (Albert), Inspecteur général du Génie Civil, Rome.

Rota (Giuseppe), Colonel du Génie naval, Directeur des Constructions navales de l'Arsenal Royal, Spezia.

Japan

Dr. **Rentaro Mizumo**, Directeur général des Ponts et Chaussées, Tokio;

Jukawa Motoomi, Directeur au Bureau de la Marine marchande au Ministère des Communications, Tokio;

Matsumura (Jun-itchi), Capitaine de vaisseau, Attaché naval à l'Ambassade du Japon, Paris.

Ishibashi Ayashiko, Kogaku-hakushi, Ingénieur du Ministère des Communications, Tokio;

Okino Tadao, Kogaku-hakushi, Ingénieur du Ministère des Communications, Tokio;

Takeda, Kantaro, Ingénieur du Ministère des Communications, Tokio.

Mexico

Salazar (Louis), Ingénieur, Directeur de l'Ecole nationale des Ingénieurs, Sous-Directeur des Travaux publics du District Fédéral, Mexico.

Monaco

X... (sera désigné ultérieurement).

Netherlands

Van der Sleyden (Ph. W.), ancien Ministre du Waterstaat, du Commerce et de l'Industrie, La Haye;

Deking Dura (Adrianus), ancien Ingénieur en chef du Waterstaat de la Province d'Overijssel, La Haye.

Norway

Kristensen (Ingvar), Director of Waterways, Kristiania.

Persia

Aerts, Alphonse, Courtier maritime, à Anvers.

Peru

Camio (D.), Consul général du Pérou, Anvers.

Portugal

Roldan y Pego (Manuel), Ingénieur des Mines, Chef de la Circonscription minière du Sud, Lisbonne.

Roumania

Saligny, Inspecteur général et Directeur général du Service hydraulique, Bucarest.

Russia

Le Prince V. N. **Shahovskoi**, Chambellan de S. M. l'Empereur de Russie, Conseiller d'Etat, Directeur de la Navigation intérieure et des Routes au Ministère des Voies de Communication, Saint-Pétersbourg;

Maximovitch, N. I. (Excellence), Conseiller privé, Ingénieur, Membre du Conseil supérieur technique des Ingénieurs au Ministère des Voies de Communication, Saint-Pétersbourg;

Florine (A.-V.), Conseiller d'Etat actuel, Directeur des Ports de Commerce et de l'Industrie, Ingénieur des Voies de Communication, Saint-Pétersbourg;

de Hoerschelmann (Emile), Conseiller privé, Membre du Conseil des Ingénieurs au Ministère des Voies de Communication, Tsarskoië-Selo près Saint-Pétersbourg;

de Schokalsky, Lieutenant Général, Collaborateur honoraire de l'Administration générale de l'Hydrographie, St-Pétersbourg;

Drigenko, Général-Major, Chef adjoint de la Direction générale de l'Hydrographie, Saint-Pétersbourg;

Kleiber (W.-H.), Conseiller d'Etat actuel, Ingénieur des Voies de Communication, Saint-Pétersbourg;

Servia

Cassel (Léon), Consul général, Bruxelles.

Siam

du Plessis de Richelieu (Phya Cholaynt Yothin) (Andreas), Vice-Amiral, Copenhague.

Spain

Arenal (Fernando Garcia), Inspecteur général des Routes, Canaux et Ports, Madrid;

Brockmann (Guillermo), Ingénieur en chef du Service des Signaux Télégraphes, Madrid ;

Ortuno (Emilio), Ingénieur, Directeur général des Postes et maritimes, Madrid.

Sweden

Hansen (Fredrik-Wilhelm), Colonel, Président de l'Administration Royale des Forces motrices hydrauliques, Stockholm.

Switzerland

de Morlot (Albert), Inspecteur fédéral en chef des Travaux publics de la Confédération suisse, Bern.

Tunis

de Fages (E.), Directeur des Travaux publics de Tunis, Tunis.

Turkey

Ismail Nazim Bey, Secrétaire de la Légation impériale ottomane, Bruxelles.

United States

Raymond (Charles W.), Brigadier General, U. S. Army, retired, Philadelphia Pa.;

Bixby (W. H.), Brigadier General and Chief of Engineers U. S. Army, Washington D. C.;

Hodges (Harry F.), Colonel, Corps of Engineers of the United States Army, Assistant Chief Engineer, Isthmian Canal Commission, Culebra C. Z. Panama;

Corthell (Elmer Lawrence), Civil Engineer, New York;

Bogart (John), Colonel, Consulting Engineer, New York;

Hon. **Hampton Moore** (Joseph), Member of U. S. Congress, Philadelphia, Pa.

Uruguay

José M. Montero y Paullier, Consul général de l'Uruguay en Espagne, Madrid.

Western Africa (French)

Boutteville (H.-G.), Inspecteur général des Ponts et Chaussées, Inspecteur général des Travaux Publics des Colonies, Paris.

Permanent Council of the International Commission

Presidents

Executive Committee

Helleputte (Georges), Ingénieur honoraire des Ponts et Chaussées, Ministre de l'Agriculture et des Travaux Publics, Ministre d'Etat, Bruxelles.

Dufourny (Alexis), Inspecteur général des Ponts et Chaussées, Bruxelles.

General Secretary

Richald (Joseph), Ingénieur principal des Ponts et Chaussées, Professeur à l'Université de Gand, Bruxelles.

Members :

Algeria

Boulogne (C.), Directeur des Travaux publics et des Mines au Gouvernement général de l'Algérie, Conseiller rapporteur, Alger.

Argentine (Republic)

Bustos Moron (H.), Ingénieur, Buenos-Ayres.

Austria-Hungary

Austria

Russ (Dr. Victor), K. K. Geheimer Rat, Exzellenz, Mitglied des Oesterreich. Herrenhauses, Praesident der Oest. Nordwest-Dampfschiffahrt Gesell., Wien;

Hungary

de Kvassay (Eugène). Conseiller ministériel, Chef de la Direction royale hongroise des Eaux, Ministère de l'Agriculture, Budapest.

Brazil

de Oliveira Lima (Manuel), Envoyé extraordinaire et Ministre plénipotentiaire, Bruxelles.

Bulgaria

Morffo (B.), Ingénieur, Directeur général des Chemins de fer de l'Etat bulgare, Sofia.

Canada

Hon. **Hazen** (John Douglass), Ministre de la Marine et des Pêcheries du Canada, Ottawa.

Chili

Lindor Perez (G.), Admiral, Chief of the Chilian Naval Commission, Londres.

China

X..., Secrétaire de la Légation de Chine, Bruxelles.

Denmark

Westergaard (Viggo), Directeur des Travaux maritimes de l'Etat, Copenhagen.

France

Charguéraud (André), Conseiller d'Etat, Inspecteur général des Ponts et Chaussées, Directeur des Routes et de la Navigation, Paris;

Cuérard (M. N. Adolphe), Inspecteur général des Ponts et Chaussées, Paris.

Germany

Freiherr von Coels von der Brügghen, Unterstaatssekretär im Ministerium der öffentlichen Arbeiten, Berlin;

Symphér (Leo), Geheimer Oberbaurat, Vortragender Rat im Ministerium der öffentlichen Arbeiten, Berlin.

Great Britain

Sir **Cecil Hertslet**, Consul général de S. M. Britannique en Belgique, Anvers.

Greece

Typaldo-Bassia, ancien Président intérimaire du Parlement, Membre de la Cour internationale permanente d'Arbitrage, Athènes

Indo-China

Boutteville (X.), Inspecteur général des Ponts et Chaussées, Inspecteur général des Travaux publics des Colonies, Paris.

Italy

Torri (Albert), Inspecteur général du Génie Civil, Rome;

Japan

Matsumura (Jun-itchi), Capitaine de vaisseau, Attaché naval à l'Ambassade du Japon, Paris;

Mexico

Salazar (Louis), Ingénieur, Directeur à l'Ecole Nationale des Ingénieurs, Sous-Directeur des Travaux publics du District Fédéral, Mexico.

Monaco

X... (sera désigné ultérieurement).

Netherlands

van der Sleyden (Ph. W.), ancien Ministre du Waterstaat, du Commerce et de l'Industrie, La Haye.

Norway

Kristensen (Ingvar), Director of Waterways, Christiania.

Persia

Aerts, Alphonse, Courtier maritime, Anvers.

Peru

Camlo (D.), Consul général du Pérou, Anvers.

Portugal

Roldan y Pego (Manuel), Ingénieur des Mines, Chef de la Circonscription minière du Sud, Lisbonne.

Roumania

Saligny, Inspecteur général et Directeur général du Service hydraulique, Bucarest.

Russia

de Timonoff (Excellence), Ingénieur des Voies de Communication et des Constructions civiles, Conseiller privé, Professeur à l'Institut des Ingénieurs des Voies de Communication, Membre du

Conseil des Ingénieurs et Directeur de la Statistique et de la Cartographie au Ministère des Voies de Communication, Membre du Conseil technique au Ministère du Commerce et de l'Industrie, Membre du Conseil statistique de l'Empire, Président du Comité hydrologique, Saint-Pétersbourg.

de Hoerschelmann (Emile), Conseiller privé, Membre du Conseil des Ingénieurs au Ministère des Voies de Communication, Tsarskoïé Selo près Saint-Pétersbourg.

Servia

Cassel (Léon), Consul général, Bruxelles.

Siam

du Plessis de Richelieu (Phya Cholaynt Yotin) (Andreas), Vice-Amiral, Copenhague.

Spain

Arenal (Fernando Garcia), Inspecteur général des Routes, Canaux et Ports, Madrid.

Sweden

Hansen (Fredrik-Wilhelm), Colonel, Président de l'Administration Royale des Forces motrices hydrauliques, Stockholm.

Switzerland

de Morlot (Albert), Inspecteur fédéral en chef des Travaux publics de la Confédération suisse, Berne.

Tunis

de Fages (E.), Directeur des Travaux publics de Tunis, Tunis.

Turkey

Ismail Nazim Bey, Secrétaire de la Légation impériale ottomane,
Bruxelles.

United States

Raymond (Charles W.), Brigadier General U. S. Army, retired,
Philadelphia Pa.;

Corthell (Elmer Lawrence), Civil Engineer, New York.

Uruguay

José M. Montero y Paullier, Consul général de l'Uruguay, en Espagne, Madrid.

Western Africa (French)

Boutteville (H.-X.), Inspecteur général des Ponts et Chaussées,
Inspecteur Général des Travaux publics des Colonies, Paris.

Delegates of Governments

Argentine (Republic)

Captain Ismael F. **Calindez**, Commander of the cruiser « Moreno ».

Dr. Octavio **Figueroa**, Civil Engineer.

Austria-Hungary

Austria

Hofrat Dr. Hermann **Matheusche**, Direktor der K. K. Lagerhäuser, Triest.

Herr **Kautzky**, Sektionsrat im k. k. Handelsministerium, Wien.

Herr Ernst **Krakowitzer**, kais. und königl. Hauptmann, Wien.

Hungary

Representing the Ministry of Commerce :

M. **de Kohanyi**, Zoltan, Inspecteur supérieur de la Navigation maritime, Budapest.

M. **Pop**, Joseph, Conseiller supérieur technique de l'autorité de la Navigation maritime à Fiume.

M. **Leard**, Jean, Secrétaire ministériel hongrois.

Representing the Ministry of Agriculture:

M. **Posa**, Charles, Conseiller technique, Budapest.

M. **de Szabo**, Nandor, Ingénieur en chef, Budapest.

Belgium

President of the Delegation :

- M. **Vanderlinden**, J. F., Inspecteur Général des Ponts et Chaussées, Administrateur-Inspecteur de l'Université de Gand, Membre de la Commission Permanente de l'Association Internationale des Congrès de Navigation, Gand.

Members of the Delegation :

- M. **Richald**, J., Ingénieur principal des Ponts et Chaussées, Professeur à l'Université de Gand, Secrétaire Général de l'Association Internationale Permanente des Congrès de Navigation, Bruxelles.
- M. **Vander Vin**, H., Ingénieur en chef Directeur des Ponts et Chaussées, Rapporteur, Anvers.
- M. **Zanen**, F., Ingénieur en chef Directeur des Ponts et Chaussées, Anvers.
- M. **Descans**, L., Ingénieur des Ponts et Chaussées, Anvers.
- M. **Claudot**, P., Ingénieur des Ponts et Chaussées, Bruxelles.
- M. **Hervy-Cousin**, Membre et Secrétaire du Conseil supérieur de la Marine, Bruxelles.

Brazil

- Dr. M. C. **de Souza Bandeira**, Ingénieur civil, Ingénieur des Travaux du port de Rio de Janeiro.
- Lieut. Commander D. R. **Marques de Azevedo**, Naval Attaché, Brazilian Embassy, Washington.
- Mr. M. **da Costa Barradas**, Commercial Attaché, Brazilian Embassy, Washington.

Canada

Department of Marine and Fisheries :

- Lieut. Col. William Patrick **Anderson**, Chief Engineer at the Department of Marine and Fisheries in Ottawa.
- Mr. Simeon **Armstrong**, Civil Engineer, Fredericton.
- Mr. John **Kennedy**, Consulting Engineer.
- Mr. F. W. **Cowie**, Civil Engineer, Montreal.

Department of Public Works :

- Mr. U. **Valiquet**, Supervising Engineer, Department of Public Works, Ottawa.
Mr. C. E. W. **Dodwell**, District Engineer, Department of Public Works, Halifax.
Mr. G. A. **Keefer**, District Engineer, Department of Public Works, New Westminster, B. C.
Mr. H. J. **Lamb**, District Engineer, Department of Public Works, Windsor, Ont.
Mr. A. R. **Decary**, District Engineer, Department of Public Works, Quebec.

Chili

- Senor Don Eduardo **Suarez**, Envoy Extraordinary and Minister Plenipotentiary of Chile in Washington.
Captain Carlos **Plaza Condell**, of the Chilean Navy, New London.
Mr. George L. **Duval**, New York City.

China

- Captain C. S. **Yang**, Chinese Navy.
Lieutenant L. Y. **Wong**, Chinese Navy.

Denmark

- M. C. M. **Hummel**, Ingénieur en chef au Service des Travaux Maritimes de l'Etat, Copenhagen.

Ecuador

- Lieutenant A. C. **Hidalgo**, Philadelphia.

France

Representing the Ministry of Public Works :

- M. **Charguéraud**, Conseiller d'Etat, Inspecteur Général des Ponts et Chaussées, Directeur des Routes et de la Navigation au Ministère des Travaux publics, Président de la Délégation, Paris.

- M. **de Joly**, Ingénieur en chef des Ponts et Chaussées, Professeur à l'Ecole Nationale des Ponts et Chaussées, Secrétaire de la Délégation, Paris.
- M. **Barrillon**, Ingénieur des Ponts et Chaussées, au Port de Bordeaux, Secrétaire adjoint de la Délégation.
- M. **Crahay de Franchimont**, Inspecteur Général des Ponts et Chaussées, Paris.
- M. **Bouvaist**, Inspecteur Général des Ponts et Chaussées, Paris.
- M. **de Pulligny**, Ingénieur en chef des Ponts et Chaussées, Directeur de la Mission française d'Ingénieurs aux Etats-Unis.
- M. **Voisin**, Ingénieur en chef des Ponts et Chaussées au Port de Boulogne-sur-Mer.
- M. **Batard-Razelière**, Ingénieur en chef des Ponts et Chaussées au Port de Marseille.
- M. **Ducrocq**, Ingénieur en chef des Ponts et Chaussées au Port du Havre.
- M. **Bourgougnon**, Ingénieur en chef des Ponts et Chaussées au Port de Marseille.
- M. **Dreyfus**, Ingénieur en chef des Ponts et Chaussées, Paris.
- M. **Le Trocquer**, Ingénieur des Ponts et Chaussées, Paris.

Representing the Ministry of Agriculture:

- M. **Dabat**, Directeur Général des Eaux et Forêts.
- M. **Nacivet**, Ingénieur des améliorations agricoles.

Representing the Ministry of Colonies:

- M. **Boutteville**, Inspecteur Général des Ponts et Chaussées, Inspecteur Général des Travaux publics des Colonies.

Representing the Ministry of Marine:

- M. **Benoist d'Azy**, Attaché naval à Washington.

Germany

A. — *Regierungsvertreter.*

- Dr. **Freiherr von Coels von der Brügghen**, Unterstaatssekretär im Ministerium der öffentlichen Arbeiten zu Berlin.
- Lusensky**, Ministerialdirektor im Ministerium für Handel und Gewerbe zu Berlin.

- Germelmann**, Geheimer Oberbaurat und vortragender Rat im Ministerium der öffentlichen Arbeiten zu Berlin.
- von Meyeren**, Geheimer Oberregierungsrat und vortragender Rat im Ministerium für Handel und Gewerbe zu Berlin.
- Tincauzer**, Geheimer Oberbaurat und vortragender Rat im Ministerium der öffentlichen Arbeiten zu Berlin.
- Dr. **Seeliger**, Wirklicher Legationsrat und vortragender Rat im Auswärtigen Amt zu Berlin.
- Thoholte**, Geheimer Baurat und vortragender Rat im Ministerium für Landwirtschaft, Domänen und Forsten zu Berlin.
- de Thierry**, Geheimer Baurat und Professor an der technischen Hochschule zu Berlin.
- Hedde**, Kais. Marinebaumeister zu Berlin.
- von Haag**, Ministerialdirektor im Württembergischen Ministerium des Innern.
- Engels**, Geheimer Hofrat und Professor an der technischen Hochschule zu Dresden.
- Schmidt**, Geheimer Baurat und vortragender Rat im Sächsischen Finanzministerium zu Dresden.
- Bubendey**, Geheimer Baurat, Wasserbaudirektor zu Hamburg.
- Boy-Ed**, Korvettenkapitän, Marineattaché zu Washington.

B. — Amtliche Teilnehmer.

- Flamm**, Geheimer Regierungsrat und Professor an der technischen Hochschule zu Berlin.
- Ehlers**, Baurat und Professor an der technischen Hochschule zu Danzig.
- F. W. Otto Schulze**, Professor an der technischen Hochschule zu Danzig.
- Schütte**, Professor an der technischen Hochschule zu Danzig.
- Wulle**, Regierungsbaumeister zu Dirschau.
- Mayburg**, Regierungsbaumeister zu Düsseldorf.
- Frentzen**, Regierungsbaumeister zu Dorsten (Lippe).
- Fuchs**, Bauamtsassessor im hydrotechnischen Bureau zu München.
- Cugenhan**, Oberbaurat bei der Württembergischen Ministerialabteilung für den Strassen- und Wasserbau, Stuttgart.

Great Britain

Lieutenant-Colonel H. A. **Yorke**, R. E., C. B., Chief Inspector of Railways.

Greece

M. Dem. **Aravantinos**, Ingénieur en chef des Travaux publics, chef de la Division d'études au Ministère de l'Intérieur.

Indo-China

M. **Boutteville**, Inspecteur Général des Ponts et Chaussées, Inspecteur Général des Travaux publics des colonies, Paris.

Italy

Representing the Ministry of Public Works :

M. **Inglese**, Ignace, Inspecteur supérieur du Génie Civil, Gênes.

M. **Sanjust di Teulada**, Edmond, Inspecteur supérieur du Génie Civil, Député au Parlement, Rome.

M. **Luiggi**, Luigi, Inspecteur supérieur du Génie Civil, Membre du Conseil Supérieur des Travaux publics et du Comité d'Administration des Chemins de fer, Professeur de Travaux maritimes à l'Université de Rome.

M. **Valentini**, Charles, Ingénieur en chef du Génie Civil, Bologne.

. Representing the Ministry of Marine :

M. **Dondona**, Philibert, Capitaine du Génie Naval, Pittsburg.

Representing the Ministry of Colonies :

Cav. Cesare **Majoni**, Consul d'Italie à Philadelphie, représentant la Colonie de Benadir.

Japan

M. Teisuke **Harada**, Chief Engineer of the Imperial Japanese Department of Home Affairs.

M. Kamosaburo **Shibata**, Secretary of the Public Works Bureau and Councillor of the Department of Home Affairs.

M. Sadayasu **Yoshida**, Secretary of Communication Bureau, Tokio.

Captain Tokutaro **Hiraga**, Imperial Japanese Navy.

Captain Jun-Itchi **Matsumura**, Imperial Japanese Navy.

M. Jikichi **Fukuda**, Engineer to the Department of Home Affairs,
Tokio.

M. Chosaku **Okumura**, Engineer to the Department of Home af-
fairs, and the Imperial Government Railway Board.

M. Kumajiro **Namikawa**, Engineer to the Department of Home

Mexico

M. Juan **Mateos**, Ingénieur Civil, Professeur à l'Ecole des Ingé-
nieurs de Mexico.

Monaco

M. **Batard-Razelière**, A., Ingénieur en chef des Ponts et Chaus-
sées, Marseille.

Netherlands

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- De Bray**, A. I., docteur en Sciences politiques et diplomatiques, directeur de l'Ecole des hautes Etudes Commerciales de Montreal, 55, Ave. Viger, Montreal, Canada.
- Decary**, Albert Roch, Civil Engineer, District Engineer, Department of Public Works, P. O. Box, 345, Quebec, Canada.
- De Hoerschelmann**, Emile, Conseiller d'Etat actuel, Membre du Conseil des Ingénieurs au Ministère des Voies de communication, 10, rue Stessel, Tsarskoïe-Selo, près Saint-Pétersbourg.
- De Joly**, G., Ingénieur en chef des Ponts et Chaussées, Professeur à l'Ecole nationale des Ponts et Chaussées, 43, avenue du Trocadéro, Paris XVI.
- Deking Dura**, Adrianus, Ancien Ingénieur en chef du Waterstaat de la province d'Overijssel, Membre de la Commission permanente, Stadhouderslaan, 53, La Haye, Pays-Bas.
- De Koninck**, G., rue Léopold, 77, Jette-Saint-Pierre, Bruxelles.
- Delbove**, L., Architecte, avenue Legrand, 27, Bruxelles.
- De Meulenaere**, O., chaussée de Merchtem, 40, Bruxelles.
- D'Epantchine**, Nicolas, Ingénieur des Voies de communication de Russie, Agence diplomatique russe, Le Caire, Egypte.
- De Rummel**, Ladislav, Conseiller d'Etat actuel, Ingénieur des Voies de communication, Directeur des travaux maritimes des ports de Riga, Réval, Pernau, etc., 27, rue Nicolas, Riga, Russie.
- De Sanctis**, Paolo, Emilio, Ingénieur, 110, Via Gioacchino Bolli, Rome.
- Descans**, Léon, Ingénieur des Ponts et Chaussées, 12, rue de Hornes, Anvers (Belgique).
- De Souza Bandeira**, Dr. Manoel Carneiro, Ingénieur civil, Ingénieur des Travaux du port de Rio de Janeiro, 52, Avenida Central, Rio de Janeiro.
- De Thierry**, Georg, Geheimer Baurat, Professor a. d. Königl. Techn. Hochschule, Membre de la Commission internationale Consultative du Canal maritime de Suez, 122, Ringbahnstrasse, Berlin-Halensee..

De Timonoff, V. E. (Excellence) Ingénieur des Voies de communication et des Constructions civiles, Conseiller privé, Professeur à l'Institut des Ingénieurs des Voies de communication, Membre du Conseil des Ingénieurs et Directeur de la Statistique et de la Cartographie au Ministère des Voies de communication, Membre du Conseil technique au Ministère du Commerce et de l'Industrie, Membre du Conseil statistique de l'Empire, Président du Comité Hydrologique, 7, Perspective Zabalkanski, Saint-Pétersbourg.

De Uhagon, Recardo, Inspecteur général du Corps national des Ingénieurs des Routes, Canaux et Ports, 4, Valenzuela, Madrid.

Devis, Félix, 22, rue de Belle-Vue, Bruxelles.

De Zafra, Juan, Manuel, Ingénieur, Professeur de Ports et Signaux Maritimes et de Constructions en béton armé à l'école spéciale des Ingénieurs des Routes, Canaux et Ports, Alcala, 83, Madrid.

De Winter, François, Ingénieur en chef, Directeur du Service des travaux maritimes de la Ville d'Anvers, 20, rue des Architectes, Anvers, Belgique.

Dixon, George Dallas, Freight Traffic Manager, Pennsylvania Railroad Co., Broad St. Station, Philadelphia.

Dillies, Camille, Industriel, rue du Halage, 54, Bruxelles.

Dodwell, C. E. W., District Engineer, Public Works Department, Halifax, N. S., Canada.

Donald, James, Consulting Naval Architect, Fore River Shipyard, Quincy, Mass.

Donnelly, Frederick William, Mayor, Trenton, N. J.

Dorp, Louis J., Ship and Engine Builder, 2728, N. 12th St., Philadelphia.

Downham, John, Civil Engineer, 1937, N. 21st St., Philadelphia.

Drew, Arthur John, Chief Draughtsman, Dept. of Wharves, Docks and Ferries, Philadelphia, 3520, N. 11th St., Philadelphia.

Dreyfus, Silvain, Ingénieur en chef des Ponts et Chaussées, 63, avenue de Villiers, Paris XVII.

Du Bosque, F. L., Assistant Engineer Floating Equipment, Penna. R. R. Co., Jersey City.

- Ducrocq**, Ingénieur en chef des Ponts et Chaussées, Le Havre.
- Dufourny**, Alexis, Inspecteur général des Ponts et Chaussées, Président de l'Association Internationale Permanente des Congrès de Navigation, 29, avenue de la Brabançonne, Bruxelles.
- Du Plessis de Richelieu**, Andréas, Vice-Amiral, Bredgade, Copenhagen.
- Durham**, Henry Welles, Chief Engineer Bureau of Highways, Borough of Manhattan, New York, 1, Gramercy Place, New York.
- Eckersley**, James Henry, Real Estate Broker, 711, Hale Bldg., Philadelphia.
- Egan**, William, Rheder, Frankfurt-am-Main, Germany.
- Ehlers**, Paul, Professor an der Techn. Hochschule zu Danzig, Kollatkstrasse, 2, Zoppot, Germany.
- Elliott**, Isaac Baker, 553, Bourse Bldg., Philadelphia.
- Endicott**, Rear Admiral Mordecai T., U. S. Navy, Retd., 1330, R Street, Washington, D. C.
- Engels**, Hubert, Geheimer Hofrat, Professor an der Technischen Hochschule in Dresden, Kaiserstrasse, 16, Dresden A.
- Fairon**, Marcel, Ingénieur honoraire des Ponts et Chaussées, 237, chaussée d'Alseberg, Forest-Bruxelles.
- Filbert**, R. Y., President Filbert Paving Co., 904, Penna. Bldg., Philadelphia, Pa.
- Fischer**, George, Regierungs- und Baurat, Nikolai-Stadtgraben 21II, Breslau, Germany.
- Fischlin**, G., rue des Cendres, Bruxelles.
- Flamm**, Oswald, Geheimer Regierungsrat, Professor an der Königl. techn. Hochschule zu Berlin, Nikolassa Lückhoffstr., 30, Berlin, Germany.
- Fontana**, Pietro, Ingegnere, via Gabrio Casati, 1, Milan, Italie.
- Ford**, Willia, G., Consulting Engineer, 190, Montague Street, Brooklyn, N. Y.

Fortier-Beaulieu, Edouard, Industriel, rue des Tanneries, Roanne, France.

Fuchs, Karl, K. Bauamtsassessor am K. Hydrotechnischen Bureau, Königinstrasse 3III, München, Germany.

Furstenau, Martin Carl, Naval Architect, 308, Walnut St., Philadelphia.

Cermelmann, Wilhelm, Geheimer Oberbaurat und Vortragender Rat im königlich preussischen Ministerium der öffentlichen Arbeiten, Wilhelmstrasse, 80, Berlin W., 66, Germany.

Gillette, Major Cassius E., Consulting Engineer, 1031, Land Title Bldg., Philadelphia, Pa.

Gillingham, Charles A., Manufacturer of Paints and Varnish, 1648, S. 12th St., Philadelphia.

Gillingham, Charles, 1226 N. Franklin St., Philadelphia

Claudot, Paul, Ingénieur des Ponts et Chaussées, 62, chaussée de Vleurgat, Bruxelles, Belgique.

Codwin, S. Hoxsie, 553, Bourse Bldg., Philadelphia.

Coffart, L. H. J., Industriel, 208, rue Masui, Bruxelles.

Griffith, William F. R., Consulting Engineer, 90, Granby St., Norfolk, Va.

Grisar, Charles, Godefroid, Banquier, Hansa Huis, 5, Canal au Sucre, Anvers, Belgium.

Grönwall, J. O. Uno, Ingénieur, Chef du bureau des phares. Stockholm.

Gugenhan, Max, Oberbaurat, Urbanstrasse, 72, Stuttgart, Germany.

Cullini, Arrigo, Ingénieur, Chef de division, Bureau de Navigation de l'Etat, 11, Via Lucullo, Rome, Italie.

Cwilliam, George T., Civil Engineer, Broadway and 58th St., New York.

Cwilliam, John, Civil Engineer, 5114, N. 12th St., Philadelphia.

Haig, Robert, Surveyor to Lloyd's Register of Shipping, 324, Bourse Bldg., Philadelphia.

- Hansen**, Frederik Wilhelm, Colonel, Président de l'Administration Royale des Forces motrices hydrauliques, Kungl. Vattenfallstyrelsen, Stockholm, Suède.
- Hardart**, Frank, Caterer, 202, S. 10th St., Philadelphia.
- Harding**, Henry McL., Consulting Engineer, Whitehall Bldg., New York.
- Harts**, Major William Wright, Corps of Engineers, U. S. Army, 2110 « O » St., N. W., Washington.
- Hasskarl**, Joseph F., Civil Engineer, 1603, Girard Ave, Philadelphia.
- Haupt**, Lewis M., Civil Engineer, 107 N. 35th St., Philadelphia.
- Hedde**, Peter, Kaiserl. Marine-Hafenbaumeister, 10III, Wrangelstrasse, Steglitz bei Berlin, Germany.
- Heebner**, Philip A., Merchant, 625, Chestnut St., Philadelphia.
- Hegelmaier**, Paul, Oberbürgermeister a. d. früher Mitglied des deutschen Reichstags, Landhauptstrasse, 631, Stuttgart, Germany.
- Heimsoth**, Carl C., Bankdirector, Marktstrasse, 19, Dortmund, Germany.
- Heiser**, Hugo, Klg. Preuss. Regierungsbaumeister, Pillau bei Königsberg, East Prussia, Germany.
- Helleputte**, Georges, Ingénieur honoraire des Ponts et Chaussées, Membre de la Chambre des Représentants, Ministre de l'Agriculture et des Travaux Publics, Ministre d'Etat, Président de l'Association Internationale Permanente des Congrès de Navigation, Bruxelles, Belgique.
- Hempstead**, William O., 41 S. 4th St., Philadelphia.
- Hemsoth**, Wilhelm, Rhedereidirektor, 29, Hohenzollernstr., Dortmund, Germany.
- Hilgard**, K. Emil, Ingénieur und Professor für Ingenieurwissenschaften an der Eidg. Techn. Hochschule, 18, Steinweissstrasse, Zürich. V., Switzerland.
- Hillebrand**, Dietrich, Kgl. Preuss. Regierungsbaumeister, Kaiserstrasse, 63 pt., Breslau, Germany.
- Hodgdon**, Frank, Civil Engineer, 131, State House, Boston, Mass.
- Hodges**, Colonel Harry F., Corps of Engineers, U. S. Army, Assistant Chief Engineer, Isthmian Canal Commission, Culebra, Canal Zone, Panama.

- Hoffmann**, Alfred, Editeur, 10, Carl Heine Strasse, Leipzig-Plagwitz.
- Hoffmann**, Robert, Civil Engineer, Chief Engineer, Dept. Public Service, 1871, East 87th St., Cleveland, O.
- Holton**, John S. W., Merchant, President, Philadelphia Maritime Exchange, Commissioner of Navigation, State of Pennsylvania, 421, Chestnut St., Philadelphia.
- Hulswit**, Jan F., Directeur de la « Haarlemsche Machienenta-briek », Leidsche vaart, 4-18, Haarlem, Holland.
- Hummel**, Christian Martinus, Ingénieur en chef au service des travaux maritimes de l'Etat, 6, Nijveij, Copenhagen, Denmark.
- Iken**, Hermann, Regierungs- und Baurat, Bahnhofstrasse, 21, Marienwerder, Germany.
- Inglese**, Ignazio, Inspecteur supérieur du Génie Civil, Gênes.
- Iskols**, A. D., Naval Architect and Marine Engineer, 14 N. College Ave., Schenectady, N. Y.
- Jacobus**, Worthington Mead, Civil and Consulting Engineer, Member New Jersey Ship Canal Commission, Rutherford, N. J.
- Jacquilot**, Ingénieur en chef des Ponts et Chaussées, 11, rue du Palais, Chaumont, H. M., France.
- Janssen**, Heinrich, Generaldirektor der Bergwerksgesellschaft Trier zu Hamm in W., Cappenberg-bei-Lunen a. d. Lippe, Germany.
- Janssen**, Theodor, Regierungsbaumeister a. D., Priv. Dozent a. d. Kgl. Techn. Hochschule zu Berlin, Mommsenstrasse, 13, Charlottenburg, Germany.
- Jefferson**, James S., Mechanical Engineer, Marine Supt., Dept. of Wharves, Docks and Ferries, 552, Bourse Bldg., Philadelphia.
- Johnsen**, Johan P., Christiania, Norway.
- Johnson**, William K., 4945, N. Broad St., Philadelphia.
- Jungel**, Jules, Kgl. Württemb. Regierungsassessor, Olgastrasse, 95, Stuttgart, Germany.

- Kauffmann, A.**, Ingénieur en chef des Ponts et Chaussées, 9, rue Dugonnier, Nantes, France.
- Kell**, Hauptmann Versuchs Abteilung der Verkehrstruppen, Schoneberg bei Berlin, Germany.
- Kelly**, Napoleon B., Secretary Philadelphia Chamber of Commerce, 211, Bourse Bldg., Philadelphia.
- Kendrick**, Murdock, Attorney at Law, 815, Crozer Bldg., Philadelphia.
- King**, James Foster, Chief Surveyor, British Corporation for the Survey and Registry of Shipping, 121, St. Vincent St., Glasgow, Scotland.
- Kirkhefer**, Adolf, Dampfsagewerks Besitzer, Kronprinzenstrasse 53, Dortmund, Germany.
- Kleiber**, W. H., Conseiller d'Etat actuel, Ingénieur des Voies de communication, 54, rue Morskaia, St. Petersbourg, Russie.
- Kleynmanns**, Jakob, Bergwerksdirektor, Recklinghausen-Sud, Westfalen, Germany.
- Knipe**, James M., 510, Mariner and Merchant Bldg., Philadelphia.
- Kozlowski**, Georg., Regierungsbaumeister, 6, Bahnhofstr., Copenick, Germany.
- Kraus**, Jacob, Dr., Ancien Ministre du Waterstaat, 33, Nassau-plein, The Hague, Holland.
- Kristensen**, Ingvar, Director of Waterways, Christiania, Norway.
-
- Lambin**, Albert, Ingénieur en chef, Directeur des Ponts et Chaussées, Chef du Cabinet du Ministre de l'Agriculture et des Travaux Publics, 181, avenue de Tervueren, Bruxelles, Belgium.
- Lapière**, Georges, Ingénieur, Membre du Conseil supérieur de l'Industrie et du Commerce, Ypres, Belgium.
- Laroche**, Charles, Ingénieur en chef des Travaux Publics des Etablissements Schneider et Cie, 42, rue d'Anjou, Paris VIII^e.
- Latta**, Harrison W., Civil Engineer and Contractor, 1319, Penna. Bldg., Philadelphia.
- Le Bourveau**, Elmer Joseph, 122 N. 12th St., Philadelphia.

- Lefebvre**, Paul François, Entrepreneur de transports, 25, quai d'Anjou, Paris.
- Lels**, Jan, Armateur, Kinderdijk, Holland.
- Le Trocquer**, Yocs, Ingénieur des Ponts et Chaussées, 3, rue Guy de Maupassant, Paris.
- Luiggi**, Luigi, Inspecteur supérieur du Génie Civil, Membre du Conseil supérieur des Travaux publics et du Comité d'Administration des Chemins de fer de l'Etat, Professeur de Travaux maritimes à l'Université de Rome, 81, Via Sardegna, Rome, Italie.
- Luneau**, Edouard, Inspecteur général des Ponts et Chaussées, 3, rue de Savoie, Versailles, France.
- Lusensky**, Franz, Ministerial-Direktor im kgl. Preuss. Ministerium für Handel u. Gewerbe, Karlsbaderstrasse, 16, Grünewald-Berlin, Germany.
- Mahieu**, Albert, Ingénieur en chef des Ponts et Chaussées, 14, avenue Mercédès, Paris XVI, France.
- Mann**, L. M., Assistant United States Engineer, Oshkosh, Wisconsin.
- Martin**, Howard F., General Manager, Pennsylvania Steel Co., Morris Bldg., Philadelphia.
- Marx**, Charles David, Professor of Civil Engineering, Stanford University, Palo Alto, California.
- Massey**, Frank H., Real Estate, 13th and Green Sts., Philadelphia.
- Maximoff**, Serge, Ingénieur des Voies de Communication, Vice-Directeur de l'Hydraulique agricole, 21, Zabalkanski Persp., St. Petersburg.
- Maxwell**, J. Walter, Stone Merchant, 30th St. below Spruce St., Philadelphia.
- Maxwell**, James T., Stone Merchant, 30th St. below Spruce St., Philadelphia.
- McCahan**, James M., Manager, The W. J. MacCahan Sugar Refining Co., 101, Chestnut St., Philadelphia.
- McCahan**, W. J., President, The W. J. MacCahan Sugar Refining Co., 101, Chesnut St., Philadelphia.

- McCarthy**, John A., Steamship Agent, 619, Lafayette Bldg., Philadelphia.
- McOwen**, Arthur H., Manufacturer, 5033, Portico St., Germantown, Philadelphia.
- McDonald**, Francis J. W., Mifflin St. Wharf, Philadelphia.
- McHenry**, Rev. Howard Preston, Supt. Seamen's and Landsmen's Aid Society, 332, S. Front St., Philadelphia.
- Mead**, Charles Adriance, Engineer of Bridges, Board of Public Utility Commissioners of New Jersey, 165, Wildwood Ave., Upper Montclair, N. J.
- Meck**, Bernhard, Konsul und Fabrikbesitzer, Nurnberg, Germany.
- Medaets**, Auguste, Entrepreneur de travaux publics, 291, avenue de Tervueren, à Woluwe-Saint-Pierre, Belgium.
- Menge**, Dr. Alfred, Fabrikant, Zell in Wiesenthal, Baden, Germany.
- Meyer**, Carl, Ingenieur u. Stadtrat, Kronprinzenstr., 16, Dortmund.
- Michiels**, Docteur Denis, 13, rue de Moulin, Montaigu, Belgium.
- Migliardi**, Giovanni, Ingénieur naval et mécanicien, Savona, Italy.
- Miller**, Commodore J. W., Vice-President, Cape Cod Construction Co., 43, Exchange Place, New York.
- Miller**, Edward Marcy, Civil Engineer, 1126, Spruce St., Philadelphia.
- Miller**, John, Steamship Agent, 455, Bourse Bldg., Philadelphia.
- Millis**, Colonel John, Corps of Engineers, U. S. Army, Newport, R. I.
- Modjeski**, Ralph, Consulting Engineer, 1750 Monadnock Bldg., Chicago.
- Monaghan**, Paul, Architect, 3602 Spring Garden St., Philadelphia.
- Mönch**, Geheimer Baurat und vortragender Rat, Reichs Marine Amt., Berlin, Germany.
- Moore**, Hon. J. Hampton, Member U. S. Congress, President Atlantic Deeper Waterways Association, President Local Organizing Commission for XIIth International Congress of Navigation, Crozer Bldg., Philadelphia.
- Mühlen**, Max, Ingénieur des Ponts et Chaussées, Dinant, Belgium.
- Müller**, Hugo, Geheimer Expedierender Secretär und Kalkulator, im Ministerium der öffentlichen Arbeiten, Ladenbergstrasse, 3, Dahlem, Berlin, Germany.

Munch-Petersen, Jon., Ingenieur am kgl. Wasserbauamt Dozent
a. d. kgl. Hochschule, Lykkeshohms Allé, 26, Kopenha-
gen V, Denmark.

Neall, Frank L., Assistant Chief, Bureau of Highways, City Hall,
Philadelphia.

Neeld, Charles W., Merchant, 509, Commerce St., Philadelphia.

Newcomer, Lieut. Colonel Henry C., Corps of Engineers, U. S.
Army, Farmers Bank Bldg., Pittsburgh, Pa.

Nilsson, Ernst Julius, Lieutenant, Royal Corps of Engineers,
Braunkyrkagatan 2a, Stockholm, Sweden.

Noble, Alfred, Civil and Consulting Engineer, 7, East 42nd St.,
New York.

Oakes, Major John C., Corps of Engineers, U. S. Army, Custom
House, Louisville, Ky.

Olcott, E. E., President Hudson River Day Line, Desbrosses St.
Pier, New York.

Ockerson, J. A., Consulting Engineer, Member Mississippi River
Commission, President American Society of Civil Engi-
neers, 1301, Liggett Bldg., St. Louis, Mo.

Palmer, Theodore B., Mifflin St. Wharf, Philadelphia.

Paratore, Dr. Joseph, Député au Parlement, Président du Sindi-
cato Maritimo Italiano et de la Mutua Nazionale Mari-
tima, 172, Via Nazionale, Rome.

Parsons, Wm. Barclay, Engineer, 60, Wall St., New York.

Perkins, Mitchell B., Chestnut St. Wharf, Philadelphia.

Perrier, Louis Charles, Ingénieur en chef des Ponts et Chaussées,
Ingénieur en chef de la Compagnie du canal de Suez,
Ismaila, Egypte.

Peters, Richard, Pennsylvania Steel Co., Morris Bldg., Philadel-
phia.

Pouzirowsky, Nestor, Counsellor of State, Engineer of Ways of
Communication, 54, Canal Catharine, St. Petersburg.

Plron, A., rue de Comines, 30, Brussels.

- Pohl**, Charles A., Civil Engineer, 141, Broadway, New York.
- Poole**, Henry H. H., Commissioner of Navigation, State of Pennsylvania, Bristol, Pa.
- Quedefeld**, Kgl. Wasserbauinspektor, Technischer Sachverständiger der öffentlichen Arbeiten, German Embassy, Washington, D. C.
- Quigley**, William H., Ship and Engine Builder, 3203, W. Susquehanna Ave., Philadelphia.
- Raithel**, Friedrich, Director, Slemdal, Villa Hova, Kristiania, Norway.
- Rava**, Gino, Ingénieur, San Lucàs, Venice, Italy.
- Raymond**, Brigadier-General Charles W., U. S. Army, Retired, General President, XIIth Congress of Navigation, Water Witch, N. J.
- Rayner**, Frank, Engineer, 1, Alexander Road, Shirewood Rise, Nottingham, England.
- Reeder**, Horace G., Dredging Machines and Towing, Bordentown, N. J.
- Rehlen**, W., Fabrikbesitzer, Schatzmeister des Vereines für Hebung der Fluss- und Kanalschiffahrt in Bayern, Nürnberg, Germany.
- Reigersman**, C. J. A., Ingénieur en chef de la province de Noord-Holland, Julianastraat, 25, Haarlem, Holland.
- Richald**, Joseph, Professeur à l'Université de Gand, Secrétaire Général de l'Association internationale permanente des Congrès de Navigation, 69, rue Archimède, Brussels, Belgium.
- Richter**, Gustav, Regierungsbaumeister, Am Kanal, 23a, Potsdam.
- Richter**, Horace, Civil Engineer on Hydrographic Work, 801, S. Front St., Philadelphia.
- Rigg**, Ernest Handfield, Naval Architect, New York Shipbuilding Co., Camden, N. J.

- Ritter**, Homer P., Assistant U. S. Coast and Geodetic Survey, Member Mississippi River Commission, Washington D. C.
- Rojdestvensky**, Alexandre, Chef de division, Ingénieur des Voies de Communication, 25, Serpouchovskaia, St. Petersburg.
- Rostock**, John Henry, U. S. Assistant Engineer, Room F 7, Army Building, New York.
- Russ**, Dr. Victor, Mitglied des Oestr. Herrenhauses, des Staatsapparates, des Wasserstrassenbeirates und des Industrierrates, 3, Lothringerstrasse, Wien I.
- Samuels**, Capt. William S., Agent for Lloyd's London and other foreign Undrs., 335, Bourse Bldg., Philadelphia.
- Sanford**, Lieutenant-Colonel J. C., Corps of Engineers, U. S. Army, General Secretary XIIth International Congress of Navigation, 590, Bourse Bldg., Philadelphia.
- Sanjust di Teulada**, Edmond, Inspecteur supérieur du Génie civil, Député au Parlement, 52, Via Valadier, Rome, Italy.
- Schildhauer**, Edward, Electrical and Mechanical Engineer, Isthmian Canal Commission, Culebra, C. Z., Panama.
- Schilling**, Ernst, Direktor der Westfälischen Transport-Aktiengesells., 121, Sunderweg, Dortmund, Germany.
- Schinkel**, Dr., Max, Regierungsbaumeister, Waitzstrasse, 41¹, Kiel.
- Schmidt**, George H., Hafendirektor, Regierungsbaumeister a. D., Gutenbergstrasse, 36, Dortmund, Germany.
- Schmidt**, Oswald, Geheimer Baurat, Wintergartenstr., 29¹, Dresden.
- Schulze**, F. W. Otto, Professor an der Technischen Hochschule in Danzig, Steffensweg, 19, Danzig-Langfuhr, Germany.
- Schumann**, Egon, Imperial Counsellor of State, Brandenburgische strasse, 15a, Sudende b. Berlin, Germany.
- Schutte**, Joh., Professor an der Technischen Hochschule zu Danzig, Germany.
- Sellers**, Coleman, Jr., President and Engineer Wm. Sellers & Co., Inc., Commissioner of Navigation, State of Pennsylvania, 1600, Hamilton St., Philadelphia.

- Sewell**, John Stephen, formerly Major, Corps of Engineers, U. S. Army, Gantt's Quarry, Ala.
- Shields**, William S. P., Contractor, 608, Witherspoon Bldg., Philadelphia.
- Simon**, Carroll Williams, Principal Assistant Engineer, Dept. of Wharves, Docks and Ferries, 2034, E. Allegheny Ave., Philadelphia.
- Smedberg**, Richard, Oberlieutenant im Kgl. Schwed. Wege- und Wasserbaucorps, Bureau Ingenieur im Kgl. Hydrographischen Bureau S. t. Eriksgatan, 2, Stockholm.
- Smith**, Albert Tate, 3226, Powelton Ave., Philadelphia.
- Smrcek**, Anton, Ingénieur, Professeur à l'Ecole Impériale et Royale technique, Brünn, Austria.
- Spada**, Domenico, Manager, Cuneo Importing Co., Philadelphia division, Race St. Pier, Philadelphia.
- Spofford**, Charles M., Hayward Professor of Civil Engineering, Massachusetts Institute of Technology, Boston, Mass.
- Spiteri**, José Rodriguez, Chief Civil Engineer of Public Works of the Province of Malaga, Malaga, Spain.
- Sproule**, George F., Secretary, Commissioners of Navigation, State of Pennsylvania, Secretary-Treasurer Local Organizing Commission, XIIth International Congress of Navigation, 349, Bourse Bldg., Philadelphia.
- Stamm**, Normann L., Engineer, Dept. of Wharves, Docks and Ferries, 3412, Race St., Philadelphia.
- Stanlford**, Charles Wilkinson, Chief Engineer, Dept. of Docks and Ferries, N. Y. City, Pier A, North River, New York.
- Stenz**, Joseph, Rheder, Mainz, Germany.
- Stephens**, Major George W., President, Harbour Commissioners of Montreal, 18, St. Alexis St., Montreal, Canada.
- Sternberg**, Oscar, Direktor u. Kgl. Schwed. V. Consul, Bismarkstrasse, Mannheim, Germany.
- Stetser**, Herbert F., Haddon Heights, N. J.
- Stevens**, T. H. G., c/o Scott and Co., Bankers, Rangoon, Burma, India.
- Symphor**, Dr. Leo., Ing., Geheimer Oberbaurat und Vortragender Rat im Ministerium der öffentlichen Arbeiten, 125, Leipzigerstrasse, Berlin, Germany.

- Szczepanitzk**, Johann, Ingenieur, k. k. Ober- Inspektor der General-inspektion der österr. Eisenbahnen, Mitglied der Standigen Delegation des IV. österr. Ingenieur-Tages, Rasumofskygasse, 2, Wien III, Austria.
- Taylor**, Frederick W., Steamship Agent, 455, Bourse Bldg. Philadelphia.
- Taylor**, James S., Steamship Agent, 455, Bourse Bldg., Philadelphia.
- Tenny**, Frank, Asst. to President, Pennsylvania Steel Co., Morris Bldg., Philadelphia.
- Terry**, J. Hermon, Civil Engineer, 1319, Pennsylvania Bldg., Philadelphia.
- Thayer**, George C., President, Kensington Shipyard Co., Beach and Palmer Sts., Philadelphia.
- Thompson**, Benjamin, Consulting Engineer, Tampa, Florida.
- Thompson**, John W., Civil Engineer, 815, Witherspoon Bldg., Philadelphia.
- Thompson**, Samuel Albert, Secretary and Treasurer, National Rivers and Harbors Congress, 824-825, Colorado Bldg., Washington.
- Thomson**, Oscar M., Special Agent, Philadelphia and Reading R. R. Co., Philadelphia.
- Tiburtius**, Carl, Marinebaumeister, Bartels Allee, 22, Kiel, Germany.
- Tintsman**, Walter B., 122 N. 12th St., Philadelphia.
- Todd**, Patrick David, Steamship Agent, Resident Manager Allan Line S. S. Co., Ltd., 421, Chestnut St., Philadelphia.
- Tomkins**, Calvin, Commissioner of Docks and Ferries, Pier A, North River, New York.
- Townsend**, Colonel Curtis McD., Corps of Engineers, U. S. Army, Jones Bldg., Detroit, Mich.
- Trainer**, Henry J., Appraiser 758 S. 10th St., Philadelphia.
- Treniukhinn**, Vladimir, Ingénieur des Voies de Communication, Kieff, Russia.
- Trier**, Ferdinand, Regierungsbaumeister, Vorsteher des Kanalbauamtes, Schäferstrasse, 15, Herne i. Westph., Germany.

Troost, J. P., Directeur Général honoraire des Ponts et Chaussées, 4, Square Ambiorix, Brussels, Belgique.

Tsionglinski, Metzislav, Counsellor of State, Engineer of Ways of Communication, Osernoi pereoulouk, St. Petersburg.

Twitchell, Selden, Retired, Bryn Mawr, Pa .

Valentini, Carlo, Ingénieur en chef du Génie Civil, Bologne, Italy.

Van de Castele, Jules, Industriel, 10, rue Saint-Nicolas, Bruges.

Vandenhoude, J. F., Entrepreneur, 578, chaussée de Jette, Jette-Saint-Pierre, Belgium.

Vanderlinden, Jean Florimond, Inspecteur général des Ponts et Chaussées, Administrateur-Inspecteur de l'Université de Gand, 27, Cour du Prince, Gand, Belgium.

Van der Schueren, Pierre Julien, Ingénieur principal des Ponts et Chaussées, 9, rue du Jardin, Ostende, Belgium.

Van der Sleyden, Ph. W., ancien Ministre du Waterstaat, du Commerce et de l'Industrie, 99, Laan van Meerdevoort, La Haye, Holland.

Vander Vin, Henri, Ingénieur en Chef, Directeur des Ponts et Chaussées, chargé du service spécial de l'Escaut maritime et de ses affluents soumis à la marée, 144, avenue Plantin, Antwerp, Belgium.

Vandeuren, Jean, Entrepreneur, Vice-Président de la Ligue de l'Industrie du Bâtiment et des Travaux Publics, 16, avenue Macau, Ixelles, Brussels.

Van de Velde, Joseph, Industriel, Scheepsdale-Bruges, Belgium.

Van Wetter, Ingénieur des Ponts et Chaussées, 2, rue des Telliers, Mons, Belgium.

Verdict, C. H., Propriétaire, 64, avenue Brugmann, Brussels.

Vergauwen, F., Directeur du Journal « Le Médecin », Gazette hebdomadaire, Boulevard Anspach, 160, Brussels.

Verschure, P. J., Président de la Société pour la favorisation des Intérêts de la Navigation intérieure des Pays-Bas, Keizersgracht, 702, Amsterdam, Holland.

Vétillart, Inspecteur général des Ponts et Chaussées, 14, rue Brémontier, Paris XVII^e.

- Victorin**, Nils, Leutnant in kgl. Wege- und Wasserbaucorps. Karlbergsvagen 8III, Stockholm.
- Vidal**, Paul, Ingénieur en chef des Ponts et Chaussées, 2, rue J. J. Bel, Bordeaux, France.
- Vodarski**, E., Counsellor of the Court, Engineer of Ways of Communication, 75, Nikolaevskaia, St. Petersburg.
- Vogt**, Ottar, Ingenieur, Havendirektor, Victor Terrassee, Christiania.
- Voisin**, Jean, Ingénieur en chef des Ponts et Chaussées, 32, rue des Vieillards, Boulogne-sur-Mer, France.
- Von Coels von der Brügghe**n, Franz (Freiherr), Unterstaatssekretär im Ministerium der öffentlichen Arbeiten, Wilhelmstrasse, 80, Berlin W. 66, Germany.
- Von Doemming**, Albert, Oberbau- und Ministerialdirektor im Ministerium der öffentlichen Arbeiten, Wirklicher Geheimer Rat, Exzellenz, Wilhelmstrasse, 80, Berlin W. 66, Germany.
- Von Ferstel**, Wolfgang (Freiherr), k. k. Baurat, Alleegasse, 39, Wien (IV), Austria.
- Von Lobbecke**, Egon, Dr. Jur., Nicolaistrasse, 3, Hildesheim-Duisburg, Germany.
- Von Meijeren**, Gottlieb, Kgl. Preuss. Geheimer Ober-Regierungsrat und Vortragender Rat im Ministerium für Handel u. Gewerbe, Holbeinstrasse, 58, Grosslichterfelde bei Berlin, Germany.
- Von Wangenheim**, (Freiherr), Walrab, Referendar, Hohenzollernstrasse, 41III, Cassel, Germany.
- Waller**, J. W., Ingénieur, Keizersgracht, Amsterdam, Holland.
- Wanger**, Irving P., Lawyer and Ex-Representative in Congress, Member National Waterways Commission, Norristown, Pa.
- Warner**, Walter J., Contractor, 606, Witherspoon Bldg., Philadelphia.
- Warnick**, Benj. C., Broker, 600, Bullitt Bldg., Philadelphia.
- Watson**, Richard James, Pier 5, North Wharves, Philadelphia.
- Way**, Joseph, Cigar Merchant, 1105, Market St., Philadelphia.

Webb, Elisha, Jr., 136 S. Front St., Philadelphia.

Weir, William Thompson, Jr., Confectioner, 1307, Rockland St.
Philadelphia.

Werkhowzow, Georges, Ingénieur des Voies de communication,
20, rue Znamenskaia, St. Petersburg, Russia.

Wilkinson, Thomas, President, Upper Mississippi River Improve-
ment Association, 715, High St., Burlington, Iowa.

Wilson, Joseph R., Attorney at Law, 606, Commonwealth Bldg.,
Philadelphia.

Wittebort, G., rue d'Irlande, 54, Brussels.

Woerman, John W., Civil Engineer, 428, Custom House, St Louis,
Mo.

Wood, Morrison, D., Publisher, 509, Cuthbert St., Philadelphia.

Woods, Henry D., Civil Engineer, 99, Highland St., West Newton,
Mass.

Wortman, H., Ingénieur en chef du Waterstaat, Haarlem, Nether-
lands.

Wyns, Alphonse, Industriel, 50, rue Philippe-le-Bon, Brussels.

Wiskott, Gustav, Jr., Kaufmann, Elisabethstrasse, 6, Dortmund.

Zanen, Franz, Ingénieur en chef Directeur des Ponts et Chaussées,
chargé de la 2^e Direction du service spécial de l'Escaut
maritime, rue van Schoonbeke, 74, Antwerp.

TEMPORARY MEMBERS

- Albrecht**, Madame G., 8, quai Van Dyck, Anvers (Belgique).
- Allan**, Andrew A., President, The Shipping Federation of Canada, 218 Board of Trade Bldg., Montreal (Canada).
- Allegri**, Madame Leopoldina Berchet, Venise (Italie).
- Anderson**, Augustus S., Passenger Manager, Red Star Line, 1319. Walnut St., Philadelphia (Etats-Unis).
- Anderson**, Mrs. Dorothea S., 64 Cooper St., Ottawa, Canada.
- Armstrong**, J. Simeon, B. A., C. E., M. Can. Soc. C. E., Fredericton, N. B. (Canada).
- Babcock**, Henry N., U. S. Assistant Engineer, Army Building, 39 Whitehall St., New York (Etats-Unis).
- Bachmetiew**, J. A., Civil Engineer, Chief Engineer of Harbor Works, Kertsch (Russie).
- Bain**, Peter, M. E., Member of the Institution of Engineers and Shipbuilders (Scotland), Editor « Marine Engineering of Canada », c/o The MacLean Publishing Co., Ltd., 143 University Ave., Toronto (Canada).
- Balsinger**, W. O., Assistant to President, Carnegie Steel Co., Pittsburgh, Pa (Etats-Unis).
- Bancroft**, General Hugh, Chairman, Directors of the Port of Boston, 40 Central St., Boston, Mass (Etats-Unis).
- Barney**, Wm. Joshua, 2nd Deputy Commissioner of Docks, 1187 Lexington Ave., New York (Etats-Unis).
- Beeber**, Hon. Dimner, President, The Commonwealth Title Insurance and Trust Co., 705 Land Title Bldg., Philadelphia (Etats-Unis).
- Belknap**, Maurice G., Attorney at Law, N. E. Cor. 13th and Chestnut Sts., Philadelphia (Etats-Unis).
- Benecke**, Dr. O., Hagenau 32, Hamburg 23 (Allemagne).

- Bertrand**, Y. F. District Engineer for the Dept. of Public Works, Isle-Verte, Co. Temiscouta, P. Q. (Canada).
- Bihler**, L. C., Traffic Manager, Carnegie Steel Co., 814 Carnegie Bldg., Pittsburgh, Pa. (Etats-Unis).
- Birkinbine**, John, Consulting Engineer, Parkway Bldg., Philadelphia (Etats-Unis).
- Bixby**, Mrs. W. H., c/o Brig. Gen. W. H. Bixby, U. S. A., Room 124, War Department, Washington, D. C. (Etats-Unis).
- Black**, Capt. R. D., Corps of Engineers, U. S. A., U. S. Engineer Office, 25 N. Pearl St., Albany, N. Y. (Etats-Unis).
- Blake**, Robert Fulton, Asst. Secretary, Submarine Signal Co., 88 Broad St., Boston, Mass. (Etats-Unis).
- Blom-Laufer**, Madame, Rue Nationale, 74, Anvers (Belgique).
- Blom**, Miss Maria, rue Nationale, 74, Anvers (Belgique).
- Bogaert**, Michel, Ingénieur-Constructeur, 38, rue de Louvain, Bruxelles (Belgique).
- Bogart**, Mrs. John, c/o Colonel John Bogart, 30 W. 59th St., New York (Etats-Unis).
- Boissevain**, Walrave, Keizersgracht 143, Amsterdam (Pays-Bas).
- Borchers**, Richard, Regierungsbaumeister, Hohestrasse 69, Duisburg (Allemagne).
- Bougher**, Howard M., 1021 N. Delaware Ave., Philadelphia (Etats-Unis).
- Bowles**, Francis T., President, Fore River Shipbuilding Co., Quincy, Mass. (Etats-Unis).
- Box**, Edward, Civil Engineer, 10 Neville St., Newcastle on Tyne (Grande-Bretagne).
- Bradley**, Col. Walter T., President, Walter T. Bradley Co., 1602 N. 15th St., Philadelphia (Etats-Unis).
- Breuning**, Charles, Jr., Membre de la firme F. A. Voigt and Co., de Rotterdam, Rotterdam (Pays-Bas).
- Brödermann**, Jorge, Engineer of Public Works, Isabela de Sagua, (Cuba).
- Bromley**, John H., Lehigh Ave., below Front St., Philadelphia (Etats-Unis).
- Bromwell**, Major Chas. S., Corps of Engineers, U. S. A., 406 P. O. Bldg., Milwaukee, Wis. (Etats-Unis).
- Brunelli**, Professor D., Director Societa di Navigazione a Vapore, Gênes (Italie).

- Bryan**, Jas. Wm., Field Secretary, National Rivers and Harbors Congress, 824 Colorado Bldg., Washington, D. C. (Etats-Unis).
- Buffington**, E. J., Président, Illinois Steel Co., Commercial National Bank Bldg., Chicago, Ill. (Etats-Unis).
- Burnham**, George, Jr., Civil Engineer, President Keystone and Iron Co., Vice-President Union Trust Co., Treas. C. H. Wheeler Mfg. Co., 1218 Chestnut St., Philadelphia (Etats-Unis).
- Busch**, Miers, 1006 Spruce St., Philadelphia (Etats-Unis).
- Campbell**, Norman W., Sales Agent, Penna. Coal and Coke Co., 1642 Land Title Bldg., Philadelphia (Etats-Unis).
- Campion**, Richard, Mariner and Merchant Bldg., Philadelphia (Etats-Unis).
- Canalizo**, J. L., Consul of Mexico, 978 Drexel Bldg., Philadelphia (Etats-Unis).
- Caples**, Capt. W. G., Corps of Engineers, U. S. A., Washington Barracks, Washington, D. C. (Etats-Unis).
- Carnbrooks**, Thomas M., Civil Engineer, Maryland Steel Co., Sparrows Point, Maryland (Etats-Unis).
- Carruth**, John G., President, Industrial Trust Title and Savings Co., Bellevue-Stratford Hotel, Philadelphia (Etats-Unis).
- Carter**, Wilton K. (Allemagne).
- Caven**, Frank H., Mgr., National Dredging and Litherage Co., 615 Fidelity Bldg., Philadelphia (Etats-Unis).
- Chace**, Mason S., Naval Architect and Shipbuilder, 31 Wales St., Boston, Mass. (Etats-Unis).
- Chamberlain**, E. J., Engineer, Sny Island Levee Drainage District, Pittsfield, Ill. (Etats-Unis).
- Chandler**, F. M., Agent Kensington Shipyard Co., Bourse Bldg., Philadelphia (Etats-Unis).
- Chandler**, Mrs. F. M., Bourse Bldg., Philadelphia (Etats-Unis).
- Chew**, David S. B., 812 Arcade Bldg., Philadelphia (Etats-Unis).
- Chmakoff**, Waldemar, Moscow (Russie).
- Clark**, F. H., General Superintendent of Motive Power, Baltimore and Ohio R. R. Co., Baltimore, Md. (Etats-Unis).

- Clark**, Prof. Charles Heber, 50 S. 4th St., Philadelphia (Etats-Unis).
- Clawson**, John L., 240 Chestnut St., Philadelphia (Etats-Unis).
- Coates**, William M., 127 Market St., Philadelphia (Etats-Unis).
- Cohen**, Charles J., Envelope Manufacturer, 508 Ludlow St., Philadelphia (Etats-Unis).
- Corthell**, Mrs. Elmer L., North Egremont, Mass. (Etats-Unis).
- Coryell**, General James B., 427 Weightman Bldg., Philadelphia (Etats-Unis).
- Cowie**, Frederick William, Chief Engineer, Harbour Commissioners of Montreal, The Linton, Sherbrooke St., Montréal (Canada).
- Crahay de Franchimont**, Madame, 12, rue du Regard, Paris VI (France).
- Craig**, J., Jr., Chester, Pa. (Etats-Unis).
- Cronemeyer**, A. L., Philadelphia Manager, Hamburg-American Line, 1334 Walnut St., Philadelphia (Etats-Unis).
- Cryer**, Miss Elizabeth, Lansdowne, Pa. (Etats-Unis).
- Coffin**, William, American Consul at Jérusalem (Syrie).
-
- Day**, Maxwell W., General Electric Co., Schenectady, N. Y. (Etats-Unis).
- De Bray**, Mrs. A. I., Montreal (Canada).
- De Joly**, Madame, 43, avenue du Trocadéro, Paris XVI (France).
- Deking Dura**, F. C., Fabricant, Dordrecht (Pays-Bas).
- Deking Dura**, Miss Sytske, Stadhouderslaan, 53, La Haye (Pays-Bas).
- De Mey**, Emile J., Importer, 802 Corinthian Ave., Philadelphia (Etats-Unis).
- De Mey**, Edouard, Civil Engineer, 802 Corinthian Ave., Philadelphia (Etats-Unis).
- De Pulligny**, Jean, Ingénieur en chef des Ponts et Chaussées, Chef de la Mission technique française aux Etats-Unis, Room 2521, Whitehall Bldg., New York (Etats-Unis).
- De Souza Bandeira**, Miss Marie, 52 Avenida Central, Rio de Janeiro (Brésil).
- Devis**, Madame Félix, 22, rue de Belle-Vue, Bruxelles (Belgique).

- Dickman**, John, Ingénieur, 28, rue Madame, Paris VI (France).
- Dinkey**, A. C., President, Carnegie Steel Co., 1116 Carnegie Bldg., Pittsburgh, Pa. (Etats-Unis).
- Doan**, Horace A., President, West End Trust Co., Broad & So, Penn Square, Philadelphia (Etats-Unis).
- D'Olier**, Wm. L., Civil and Mechanical Engineer, President, d'Olier Engineering Co., 1307 Moriss Bldg., Philadelphia (Etats-Unis).
- Donald**, Mrs. J., 66 Chestnut St., Boston, Mass. (Etats-Unis).
- Dodge**, James Mapes, President and General Manager, The J. M. Dodge Co., McKean Ave., Germantown, Philadelphia (Etats-Unis).
- Donnelly**, William T., Consulting Engineer, 17 Battery Place, New York (Etats-Unis).
- Dorp**, Mrs. H., 2728 N. 12th St., Philadelphia (Etats-Unis).
- Dufresne**, A. R., Asst. Chief Engineer, Public Works Dept., Ottawa (Canada).
- Dumas**, Albin, Ingénieur des Arts et Manufactures, Rédacteur en chef du « Génie Civil », 6, rue de la Chaussée d'Antin, Paris (France).
- Dunning**, James E., American Consul, Le Havre (France).
-
- Earnshaw**, George E., President. Earn Line Steamship Co., 282 S. 23d St., Philadelphia (Etats-Unis).
- Earnshaw**, Mrs. Geo. E., 282 S. 23d St., Philadelphia (Etats-Unis).
- Ebelt**, Otto, Regierungsbaumeister, Gildehof-Str. 4, Essen-Ruhr (Allemagne).
- Edmunds**, Henry R., Attorney at Law, 520 Walnut St., Philadelphia (Etats-Unis).
- Edmunds**, Miss Adeline W., 520 Walnut Str., Philadelphia (Etats-Unis).
- Elworthy**, F., Secretary, Victoria, B. C., Board of Trade, Victoria, B. C. (Canada).
- Emmet**, W. L. R., General Electric Co., Schenectady, N. Y. (Etats-Unis).
- Erskine**, E. B., Molson's Bldg., Vancouver, B. C. (Canada).

- Escher**, G. A., ex Chief Engineer-Director of the Waterstaat of Holland, Arnhem (Pays-Bas).
- Evans**, George B., Druggist, 1106 Chestnut St., Philadelphia (Etats-Unis).
- Faires**, B. M., Vice-President, Fourth St. National Bank, 245 So. 13th St., Philadelphia (Etats-Unis).
- Farber**, Fritz, Oberingenieur, Beurhausstr. 3, Dortmund (Allemagne).
- Field**, Harry S., 21st St. und Sedgley Ave., Philadelphia (Etats-Unis).
- Fletcher**, Frank D., Clerk, Committee on Rivers and Harbors, House of Representatives, Washington (Etats-Unis).
- Forneret**, Victor F. W., Superintending Engineer of the River St. Lawrence Ship Canal, Dept. of Marine and Fisheries, Ottawa (Canada).
- Frear**, Miss I. D., House « O », Navy Yard, Philadelphia (Etats-Unis).
- Frentzen**, Karl, Königlicher Regierungsbaumeister, Gildehofstrasse 4, Essen-Ruhr (Allemagne).
- Frisbee**, Oliver L., Chairman, Public Improvements Committee, N. H. (Etats-Unis).
- Galindez**, Mrs. Amelia, c/o Captain I. F. Galindez, N. Y. Shipbuilding, Camden, N. J. (Etats-Unis).
- Genest**, Arthur T., Ingénieur adjoint au Ministère des Travaux publics, 519 King Edward Ave., Ottawa (Canada).
- Gillette**, Halbert Powers, Editor in Chief, « Engineering and Contracting », 608 S. Dearborn St., Chicago, III. (Etats-Unis).
- Congora**, Victorio E., Civil and Electrical Engineer, Centro Mercantil 3r Piso 12-15, Mexico City (Mexique).
- Goodell**, John M., Editor, « Engineering Record », 239 W. 39th St., New York (Etats-Unis).
- Goldmark**, Henry, Designing Engineer, Isthmian Canal Commission, Culebra, C. Z. (Panama).
- Takeda**, Kantaro, Ingénieur du Ministère des Communications. New Hampshire Legislature, 200 Cass St., Portsmouth,

- Gransback**, Harry, Builders' Supplies, 3159 E. Thompson St., Philadelphia (Etats-Unis).
- Grant**, Capt. A. W., Commandant, Navy Yard, Philadelphia (Etats-Unis).
- Grant**, Kenneth C., 444 Richmond Ave., South Orange, N. J. (Etats-Unis).
- Grove**, Henry S., President, The William Cramp and Sons Ship and Engine Building Co., Beach and Ball Sts., Philadelphia (Etats-Unis).
- Guthrie**, J. A., Jr., Marine Adjuster, Penna. R. R. Co., Broad St. Station, Philadelphia (Etats-Unis).
- Guttstadt**, Government Architect, Landhauptstr. 52, Berlin-Wilmersdorf (Allemagne).
- Goodrich**, E. P., Consulting Engineer, 35 Nassau St., New York (Etats-Unis).
- Hagar**, Arthur P., Marine Engineer, 2 Rector St., New York (Etats-Unis).
- Hagemans**, P., Consul General of Belgium, 6357 Woodbine Ave., Overbrook, Philadelphia (Etats-Unis).
- Hall**, Bordman, 114 State St., Boston, Mass. (Etats-Unis).
- Halyburton**, C., Ship Chandlery and Engineer's Supplies, 217 Walnut St., Philadelphia (Etats-Unis).
- Harbison**, Thos. B., of firm « Harbisons » Dairies, 2015 Dreer St., Philadelphia (Etats-Unis).
- Harris**, Franklin M., Jr., 1913 N. 33d St., Philadelphia (Etats-Unis).
- Hegardt**, G. B., Engineer, Commission of Public Works, 1010 Board of Trade Bldg., Portland, Ore (Etats-Unis).
- Hemsoth**, Mrs. Wilhelm, 29 Hohenzollernstr., Dortmund (Allemagne).
- Herr**, H. T., Vice President, The Westinghouse Machine Co., East Pittsburgh, Pa. (Etats-Unis).
- Hervy-Cousin**, Madame, rue d'Ecosse, 20, Bruxelles (Belgique).
- Hilken**, Henry G., P. O. Box 1130, Baltimore, Md. (Etats-Unis).
- Hinman**, Herbert Davis, Assistant Engineer in charge, Pedro Miguel Lock, Pedro Miguel, C. Z., (Panama).

Hiraga, Tokutaro, Captain, Imperial Japanese Navy, Japanese Embassy, Washington (Etats-Unis).

Hoag, S. W., Jr., Deputy Chief Engineer, Department of Docks and Ferries, Pier A, North River, New York (Etats-Unis).

Hodgdon, Mrs. Frank W., 40 Central St., Arlington, Boston, Mass. (Etats-Unis).

Hoffman, George F., 312 Market St., Philadelphia (Etats-Unis).

Hollar, Wm. H., President, The Hollar Co., Engineers, 421 Chestnut St. Philadelphia (Etats-Unis).

Hollis, Prof. Ira N., Harvard University, Cambridge, Mass. (Etats-Unis).

Hornblower, Henry, President, Boston Stock Exchange, 60 Congress St., Boston, Mass. (Etats-Unis).

Horstmann, Walter, Manufacturer, 5th and Cherry Sts., Philadelphia (Etats-Unis).

Howard-Smith, S., 4838 Pulaski Ave., Germantown, Philadelphia (Etats-Unis).

Hulswit, Mrs. G. F., Leidsche vaart 4-18, Haarlem (Pays-Bas).

Humphrey, Richard L., Consulting Engineer, Harrison Bldg., Philadelphia (Etats-Unis).

Hutchinson, Sydney E., President, Jefferson Fire Insurance Co., 425 Walnut St., Philadelphia (Etats-Unis).

Inglese, Italo, via Curbatone 2, Gênes (Italie).

Iustus, Lorenz, Ingenieur, Nicolajeff (Russie).

Iustus, Mrs. Nathalie, Nicolajeff (Russie).

Jackson, J. T., Real Estate, 13th and Chestnut Sts., Philadelphia (Etats-Unis).

Jervey, Major Henry, Corps of Engineers, U. S. Army, U. S. Engineer Office, Room 405, Custom House, Cincinnati, Ohio, (Etats-Unis).

Johns, John N., President, North River Warehouse Co., 30 Church St., New York (Etats-Unis).

Johnson, Prof. Emory R., Logan Hall, University of Pennsylvania, Philadelphia (Etats-Unis).

- Jolles**, C. A., Ingénieur en chef Directeur du Waterstaat, Arnhem (Pays-Bas).
- Jones**, James Collins, Attorney at Law, Vice-Président, Keystone Telephone Co., 460 Bullitt Bldg., Philadelphia (Etats-Unis).
- Jurasz**, Karl O., Ingénieur, Essenhorster Strasse 456, Altenessen (Allemagne).
- Kapeller**, Aug., Industriel, 111, boulevard Léopold II, Bruxelles (Belgique).
- Kasitzin**, Dmitry, Président du Conseil Municipal de la Ville de St. Pétersbourg, 82, Moika, St. Pétersbourg (Russie).
- Kauermann**, A., Generaldirektor der Deutschen Maschinenfabrik A.-G., Duisburg (Allemagne).
- Kaufman**, Philip L., Civil Engineer, 104 S. Michigan Ave., Chicago (Etats-Unis).
- Kennedy**, W. Allan, Secretary, The Vancouver Branch Canadian Society of Civil Engineers, 413 Pacific Bldg., Vancouver, B. C., (Canada).
- Kellen**, William V., Cohasset, Mass. (Etats-Unis).
- King**, Mrs. James Foster, 121 St. Vincent St., Glasgow (Ecosse).
- Kirby**, Frank E., 609 Stevens Bldg., Detroit, Mich. (Etats-Unis).
- Kirkpatrick**, George E., Supt. Girard Estate, Lafayette Bldg., Philadelphia (Etats-Unis).
- Kirkpatrick**, H. B., 1011 Grove St., Evanston, Ill. (Etats-Unis).
- Kobayashi**, Taizo, Kogakwhakushi, City Engineer, Osaka City Office, Osaka (Japon).
- Kolischer**, Theodore, Manufacturer, 140 N. 10th St., Philadelphia (Etats-Unis).
- Kortchynsky**, Lucien, Ingénieur des Voies de Communication, Sous-Directeur des Voies de Communication de l'Arrondissement, boulevard Tchistoproudny, Moscou (Russie).
- Kortchynsky**, Miss Marie, boulevard Tchistoproudny, Moscou (Russie).
- Knowles**, Morris, Civil Engineer, Oliver Bldg., Pittsburgh, Pa. (Etats-Unis).
- Kratz**, Paul, c/o Dr. William Miller, 8th and Mt. Vernon Sts., Camden, N. J. (Etats-Unis).

- Laknisky**, V. E., Engineer of Ways of Communication, c/o The Institute of Ways of Communication, St. Petersburg (Russie).
- Lamb**, H. J., District Engineer, Dept. of Public Works, Windsor, Ont. (Canada).
- Lamoureux**, Joseph, Civil Engineer, P. O. Box 172, Three Rivers, Que. (Canada).
- Landsberg**, Mrs. Else, Victoriast. 17, Berlin W. 10 (Allemagne).
- Lavino**, E. J., Bullitt Bldg., Philadelphia (Etats-Unis).
- Le Boutillier**, Henry, Wayne, Pa. (Etats-Unis).
- Lefebvre**, A., Directeur de la Compagnie des Phosphates de Constantine, 55, rue de Châteaudun, Paris (France).
- Lefevre**, Emile, Civil Engineer, 406 S. 9th St., Philadelphia (Etats-Unis).
- Lehman**, George M., Engineer in Charge Flood Commission of Pittsburgh, Pa., 1808 Arrott Bldg., Pittsburgh, Pa. (Etats-Unis).
- Lehmann**, Friedrich, Stadtbaurat, Osnabruck (Allemagne).
- Lels**, Mrs. Jan, Kinderdijk (Pays-Bas).
- Leonard**, R. W., Chairman, National Transcontinental Railway Commission, Corry Bldg., Ottawa (Canada).
- Lewis**, John Frederick, Attorney at Law, 108 S. 4th St., Philadelphia (Etats-Unis).
- Lewis**, Wilfred, President, The Labor Mfg. Co., 5901 Drexel Rd., Philadelphia (Etats-Unis).
- Lindenthal**, Mrs. Gustav, 68 William St., New York (Etats-Unis).
- Lisse**, Leopold, Königl. Bergassessor, Kantstr. 143, Charlottenburg (Allemagne).
- Lobnitz**, Fred., c/o Lobnitz and Co., Ltd., Renfrew (Ecosse).
- Long**, Howard M., Attorney at Law, 133 Land Title Bldg., Philadelphia (Etats-Unis).
- Lowrie**, W. M., General Passenger Agent, Northern S. S. Co., 1184, Broadway, New-York (Etats-Unis).
- Lucas**, Major, E. W. Van C., Consulting Engineer, 280 Broadway, New-York (Etats-Unis).
- Luis** Dr., J. J., Cuban Consul, 608, Chestnut str., Philadelphia (Etats-Unis).
- Lynn**, Daniel E., National Lead Co., Port Huron, Michigan (Etats-Unis).

- Mack**, A. F., Freight Agent, U. S. Steel Products Co., 30, Church St., New-York (Etats-Unis).
- Marburg**, Prof. Edgar, University of Pennsylvania, Philadelphia (Etats-Unis).
- Martinowsky**, Michael, Engineer, Cherson (Russie).
- Matsumoto**, Torata, Engineer of the Keeling Harbour Works, Formosa (Taiwan), (Japon).
- McDonough**, Miss Mary R., c/o Colonel John Bogart, 30 W., 59th st., New-York (Etats-Unis).
- Mc Leod**, John, Asst. to President, Carnegie Steel Co., 814, Carnegie Bldg., Pittsburgh, Pa (Etats-Unis).
- Medley**, Edouard, Ingénieur civil, Isabela de Sagua (Cuba).
- Meiners**, Hans, Civil Engineer, Wiesenstrasse, 1, Bredeney b. Essen-Ruhr (Allemagne).
- Mercier**, Paul E., Prof. Ecole Polytechnique of Montreal, Canada, 503 Power Bldg., Montreal (Canada).
- Mertens**, Charles, Premier Commis des Ponts et Chaussées, 19 avenue des Deux Tilleuls, Bruxelles, N. E. (Belgique).
- Mettlach**, A. E., Whitehall Bldg., New-York (Etats-Unis).
- Miles**, George F., Mm. Inst. of C. E. of Ireland, Pomfret Centre, Conn. (Etats-Unis).
- Miller**, Spencer, Chief Engineer, Lidgerwood Mfg. Co., 96 Liberty St., New-York (Etats-Unis).
- Melgs**, John, Assistant Director, Department of Wharves, Docks and Ferries, 553, Bourse Bldg., Philadelphia (Etats-Unis).
- Moe**, Christian, Royal Vice-Consul of Norway and Denmark, 305 Walnut St., Philadelphia (Etats-Unis).
- Moore**, Mrs. J. Hampton, c/o Hon. J. Hampton Moore, M. C., Crozer Bldg., Philadelphia (Etats-Unis).
- Moore**, Dr W. H., 1430, Girard Ave., Philadelphia (Etats-Unis).
- Moore**, Miss B. V., 1430 Girard Ave., Philadelphia (Etats-Unis).
- Muckle**, John S., Mechanical Engineer, 2023, Walnut St., Philadelphia (Etats-Unis).
- Mudra**, Arthur, Imperial German Consul, 226 So. 7th St., Philadelphia (Etats-Unis).
- Mühlen**, Mrs. Max, Dinant (Belgique).
- Munn**, F. W., 311 1/2 Walnut St., Philadelphia (Etats-Unis).

- Munroe**, James P., Vice-President, Boston City Club, Secretary and Treasurer Boston Local Commission, 131 State St., Boston, Mass. (Etats-Unis).
- Murphy**, John, Electrical Engineer, Dept. of Railways and Canals, and Board of Railway Commissioners for Canada, Ottawa (Canada).
- Melville**, Rear Admiral George W., U. S. N., Retd., 620 N. 18th St., Philadelphia (Etats-Unis) (décédé).
- Narcy**, Jean Philippe, Notaire, 90, Boulevard de Strasbourg, Le Havre (France).
- Neely**, W. C., Marine Inspector Penna. R.R. Co., Broad St. Station, Philadelphia (Etats-Unis).
- Nelson**, Wm. A., Secretary, Fay Manila Roofing Co., Delaware Ave. and Elm St., Camden, N. J. (Etats-Unis) .
- Newbern**, R. H., Superintendent Insurance Department, Penna. R. R. Co., Broad St. Station, Philadelphia (Etats-Unis).
- Ockerson**, Mrs. J. A., 501 Clara Ave, St. Louis, Mo (Etats-Unis).
- Oman**, Commander Joseph W., Commanding U. S. S. « Maine », Washington, D. C. (Etats-Unis).
- Ostheimer**, William J., Importer, Union League, Philadelphia, (Etats-Unis).
- Pain**, Attilio, Ingénieur, Riva degli Schievoni, Venise (Italie).
- Parks**, C. W., Civil Engineer, U. S. Navy, Public Works Officer, Navy Yard, Philadelphia (Etats-Unis).
- Parks**, Mrs. C. W., House « O », Navy Yard, Philadelphia (Etats-Unis).
- Passmore**, Lincoln K., Vice President, Penn Mutual Life Insurance Co., 925, Chestnut St., Philadelphia (Etats-Unis).
- Pearson**, Brig. Gen. Gardner W., M. V. M. Adjudant General Commonwealth of Massachusetts, State House, Boston (Etats-Unis).
- Pattison**, James, Sales Manager, American Gasaccumulator Co., 404 Perry Bldg., Philadelphia (Etats-Unis).

- Peck**, Myron Hall, Assoc. M. Am. Soc. C. E., 6426, Duncan St., Oakland, California (Etats-Unis).
- Perry**, R. A., President, Standard American Dredging Co., Stocker and Holland Bldg., Oakland, California (Etats-Unis)
- Pradel**, Antonio, Ingénieur civil, Etat de Rio Grande do Sul, Pelotas (Brésil).
- Pringle**, Mrs. R. A., Ottawa (Canada).
- Putnam**, Prof. Frederick W., Peabody Museum of Harvard University, Cambridge, Mass. (Etats-Unis).
- Quigley**, Mrs. Wm. H., 3203 W. Susquehanna Ave., Philadelphia, (Etats-Unis).
- Reid**, Chas. E., Secretary, North Side Board of Trade. 260 E. 138th St., New-York (Etats-Unis).
- Richald**, Mrs. J., 69, rue Archimède, Bruxelles (Belgique).
- Rinkel**, Hermann, Königl. Preuss. Geheimer Komerzienrat, Brinken Allee 2, Berlin N. W. (Allemagne).
- Riehle**, Frederick A., President, Riehle Bros. Testing Machine Co., Inc., 1424 N. 9th St., Philadelphia (Etats-Unis).
- Ripley**, Theron M., Barge Canal Resident Engineer, Fulton, N. Y. (Etats-Unis).
- Risser**, Johannes, Riegierungs- und Baurat, Speyer a/Ruhr (Allemagne).
- Ritter**, Mrs. Homer P., c/o Mr. H. P. Ritter, U. S. Coast and Geodetic Survey, Washington (Etats-Unis).
- Robb**, Thomas, Manager, The Shipping Federation of Canada, 218 Board of Trade Bldg., Montreal (Canada).
- Robinson**, A. W., Consulting Engineer, 14, Phillips Square, Montreal (Canada).
- Robinson**, Laforest Geo., Engineer, 211 Holden Bldg., Vancouver, B. C. (Canada).
- Robinson**, R. H., Naval Constructor, U. S. Navy, Washington, D. C. (Etats-Unis).
- Rogers**, Robert H., Electrical Engineer, General Electric Co., Schenectady, N. Y. (Etats-Unis).

- Rollins**, James W., President, Boston Society of Civil Engineers, 6, Beacon St., Boston, Mass., Etats-Unis.
- Rondeau**, Fd., 109, Boulevard Léopold, Anvers (Belgique).
- Rourke**, L. K., Commissioner of Publics Works, Boston, Mass., Etats-Unis.
- Russell**, John B., 40, Central Street, Boston, Mass. (Etats-Unis).
- Russell**, Joseph B., President, Boston Chamber of Commerce, 114 State St., Boston (Etats-Unis).
- Ryan**, James J., Contractor, 514, Penna. Bldg., Philadelphia Etats-Unis.
- Sanford**, Mrs. J. C., Hotel Normandie, 36th and Chestnut Sts., Philadelphia (Etats-Unis).
- Sanford**, Miss Faith L. M., Hotel Normandie, 36th and Chestnut Sts., Philadelphia (Etats-Unis).
- Sandstrom**, Felix, Technical Engineer, American Gasaccumulator Co., 404 Perry Bldg., Philadelphia (Etats-Unis).
- Saph**, A. V., Assistant State Engineer, 2330, Durant Ave., Berkeley, California (Etats-Unis).
- Savrimovitch**, Joseff, Ingénieur militaire, Nicolaevsky, 1, Kronstadt, (Russie).
- Scharff**, Th., Admiralitätsstr., 56II, Hambourg (Allemagne).
- Schilling**, Mrs. W., 121 Sunderweg, Dortmund (Allemagne).
- Schilling**, Miss W., 121, Sunderweg, Dortmund (Allemagne).
- Schmidt**, geb. Cremers, Elisabeth, Gutenbergstrasse 36, Dortmund (Allemagne).
- Schoff**, Wilfred H., Secretary, The Commercial Museum, 34th St. below Spruce St., Philadelphia (Etats-Unis).
- Schulte**, F., Oberingenieur, 49 Saarbrückerstrasse, Dortmund (Allemagne).
- Scott**, Alex., Artist, 804 Pine St., Philadelphia (Etats-Unis).
- Seaman**, Henry B., Consulting Engineer, 165. Broadway, New-York (Etats-Unis).
- Searless**, J. W., 17, Battery Place, New-York (Etats-Unis).
- Sherman**, Henry P., Engineer of Inland Waterways of N. J., State House, Trenton, N. J. (Etats-Unis).

- Sissoeff**, Serge, Civil Engineer, 3 Sérpuchowskaya, St. Petersburg (Russie).
- Smith**, Oberlin, President, Ferracute Machine Co., Bridgeton, N. J. (Etats-Unis).
- Smith**, Samuel K., Treasurer, Harlan and Hollingsworth Corporation, Wilmington, Delaware (Etats-Unis).
- Smreck**, Madame Bozena, Sturmgasse, 12, Bruenn (Autriche).
- Sperry**, Elmer A., 74 Broadway, New-York (Etats-Unis).
- Spalding**, Walter James, Assistant Engineer, Pacific Division, Balboa, C. Z. (Panama).
- Sproule**, Mrs. Geo. F., Golf Road E. of City Line, Overbrook Philadelphia (Etats-Unis).
- Staake**, William H., Judge, Court of Common Pleas, No. 5, 648, City Hall, Philadelphia, Etats-Unis.
- Stackle**, Peter, Ingénieur des Voies de Communication, rue Kozak, 4, Blagovyeshchensk (Sibérie).
- Stall**, Roy L., District Passenger Agent, Penna. R. R. Co., 1433 Chestnut St., Philadelphia (Etats-Unis).
- Stead**, Geoffrey, District Engineer, Dept. of Public Works, Chatham, N. B. (Canada).
- Stearns**, Frederic P., Consulting Engineer, 1, Ashburton Place, Boston (Etats-Unis).
- Stenz**, Mrs. Hilma, Mainz (Allemagne).
- Stevens**, Col. E. A., State Commissioner of Publics Roads, N. J., State House, Trenton, N. J. (Etats-Unis).
- Stevens**, J. Franklin, Consulting Electrical Engineer, 1326, Chestnut St., Philadelphia (Etats-Unis).
- Stratton**, W. H., 30, Church St., New-York.
- Tattersfield**, Maxwell, Manager, Lighting Department, General Electric Co., Whitespace Bldg., Philadelphia (Etats-Unis).
- Taylor**, Frank B., 598, Home Ave., Fort Wayne, Indiana (Etats-Unis).
- Taylor**, Mrs., M. A., 547, Marshall St., Philadelphia.
- Thoholte**, Mrs., R., Filandastrasse, 7a, Berlin-Steglitz (Allemagne).

- Thoholte**, R., Geheimer Baurat und vortragender Rat, Filandastrasse, 7a, Berlin-Steglitz (Allemagne).
- Thomas**, Edgar B., Assistant Engineer in charge of Rivers and Harbors, 304 City Hall, Cleveland, O. (Etats-Unis).
- Thompson**, Miss Katheryne L., 3804, Spring Garden St., Philadelphia (Etats-Unis).
- Thompson**, William A., United-States Assistant Engineer, La Crosse, Wis. (Etats-Unis).
- Thompson**, William G. B., Pedro Miguel, C. Z., Panama.
- Thurlow**, Mrs. Caroline E., Hotel Normandie, 36th and Chestnut Sts., Philadelphia (Etats-Unis).
- Tiapkin**, N. D., Professor, Direktor v. d. Ingenieur Hochschule, Bachwetjewskaia, 15, Moscow (Russie).
- Tiburtius**, Mrs. Gertrude, Bartels Allee, 22, Kiel, Allemagne.
- Tilden**, William, T., President, William T. Tilden Co., Inc., President, The Union League of Philadelphia, 254 N. Front St., Philadelphia (Etats-Unis).
- Titcomb**, George E., Mechanical Engineer, 50, Church St., New-York (Etats-Unis).
- Trautwine**, John C., Jr., Civil Engineer, 257 S. 4th St., Philadelphia (Etats-Unis).
- Valiquet**, U., Supervising Engineer, Public Works Dept., Ottawa (Canada).
- Vanderham**, C. A., c/o L. J. Vanden Bok, 149 W. 35th St., New-York (Etats-Unis).
- Vanderlinden**, Mrs. J. F., Cour du Prince, 27, Gand (Belgique).
- Van Sciver**, Geo. D., President, De Frain Sand Co., Vice-President, Kensington Engine Works Co., Beach and Berks Sts., Philadelphia (Etats-Unis).
- Van der Sleyden**, Mrs., 99, Laan van Meerdevcort, La Haye (Pays-Bas).
- Vansant**, Dr. Eugene Larue, 1929, Chestnut St., Philadelphia, Etats-Unis.
- Verdictt**, Madame C. H., 64, avenue Brugmann, Bruxelles, Belgique.
- Vianello**, Francesco, Capitano Marittimo, Riva degli Schievoli, Venise (Italie).

- Villa**, Miguel, Engineer, Port Company of Cuba, Habana, 88, La Havane (Cuba).
- von Haag**, Philipp, Praesident, Ministerialdirektor im Königl. Wurt., Ministerium des Inneren, Stuttgart, Allemagne.
- Voisin**, Madame J., 32, rue des Vieillards, Boulogne-sur-Mer, (France).
- Volckman**, George William, Civil Engineer, 197, Sparke St., Ottawa (Canada).
- Vosnessensky**, Peter, Chief of St. Petersburg Port Works, Basseinaya, St. 46, St. Petersburg (Russie).
- Wauthy**, Miss Marie Louise, Sin-le-Noble, Douai (France).
- Webster**, George S., Chief Engineer and Surveyor, 412, City Hall, Phila (Etats-Unis).
- Weller**, J. L., Superintending Engineer, Welland Canal, St. Catharines, Ontario (Canada).
- Weller**, Mrs. J. L., St. Catharines, Ontario, Canada.
- Weller**, Miss M. L., St. Catharines, Ontario, Canada.
- Whittemore**, Geo. F., Civil Engineer, U. S. Engineer Department, Hilo Breakwater, Hilo, Hawaii.
- Whidden**, Guy C., Editor, Journal of the Congress, Wyncote, Pa (Etats-Unis).
- White**, Colonel H. K., U. S. Marine Corps, Southport, N. C. (Etats-Unis).
- White**, Mrs. H. K., Southport, N. C.
- Wicker**, Cyrus F., Secretary, American Legation at Tanger (Maroc).
- Williams**, Ralph. D., Editor, Marine Review, Cleveland, O. (Etats-Unis).
- Wilson**, W. J., Representing Hon. James H. Hawley, Governor of Idaho (Etats-Unis).
- Wolf**, Otto C., Engineer and Architect, 511, Denckla Bldg., 11th and Market Sts., Philadelphia (Etats-Unis).
- Wolfsholz**, Aug., Ingenieur, Schlachtensee bei Berlin (Allemagne).
- Wood**, J. R., General Passenger Agent, Penna. R. R. Co., Broad St. Station, Philadelphia (Etats-Unis).

Wood, Walter, Manufacturer, 400 Chestnut St., Philadelphia (Etats-Unis).

Wulle, Karl, Regierungsbaumeister, Dirschau (Allemagne).

Yates, William Henry, Supervising Engineer, N. Y. State Barge Canal, 84, Willett St., Albany, N. Y. (Etats-Unis).

Yorke, Mrs. H. A., 8, Richmond Terrace, Whitehall, S. W. London (Grande-Bretagne).

Zeller, Edwin A., Jr., 433 E. Mt. Airy Ave., Philadelphia (Etats-Unis).

Ziloff, Georges, Engineer, Taganrog (Russie).

Zimmerman, Dr. Erich W., Düsseldorf (Allemagne).

Zwetaieff, Woldemar, Devitchie Pole, Moscow (Russie).

The following were prevented from attending the Congress :

Aerts, Alphonse, Membre du Conseil Supérieur de l'Industrie et du Commerce, Anvers (Belgique).

Aleshire, Brigadier-Général James B., Quartermaster General, U. S. A.

Alexander, Hon. De Alva S., ex-Chairman, Committee on Rivers & Harbors, U. S. House of Representatives.

Aravantinos, Ingénieur en chef des travaux publics, Athènes.

Barnes, Mortimer G., Civil Engineer.

Basinger, James Garnet, Civil Engineer.

Bergelmer, Sven, Direktor der Staats-Eisenbahnen.

Berni, Prof. Chevalier.

Bienenfeld, Bernard, Consulting Engineer.

Bigottl, Lorenzo, Général en retraite de l'Armée italienne, Turin.

Boggs, Major Frank C., Corps of Engineers, U. S. Army.

Borde, Gustave, Armateur.

Broemel, Max, Generalsekretär, Mitglied des Hauses der Abgeordneten.

Carpi, Leonardo, Ingénieur, Architecte.

Clark, John J., Ship and Cargo Surveyor.

Crandall, James L., Civil Engineer.

Davaux, Ch., Brussels.

Deking Dura, Adrianus, Ancien Ingénieur en chef du Waterstaat de la province d'Overijssel.

De Létay, Louis, Conseiller technique du Ministère de l'Agriculture, Budapest.

De Sanctis, Paolo, Emilio, Ingénieur.

De Uhagon, Recardo, Inspecteur général du Corps national des Ingénieurs des Routes, Canaux et Ports.

Devis, Félix, Brussels.

De Wulf, Léon, Echevin du Commerce et de l'Industrie, Bruges.

Du Bosque, F. L., Assistant Engineer.

Dufourny, Alexis, Inspecteur Général des Ponts et Chaussées, Président de l'Association Internationale Permanente des Congrès de Navigation, Bruxelles.

Du Plessis de Richelieu, Andréas, Vice-Amiral, Copenhague.

Egan, William, Rheder.

Ford, William G., Consulting Engineer.

Freymark, Dr., Syndikus der Handelskammer.

Goethals, Colonel George W., Corps of Engineers, U. S. Army.

Goffart, L. H. J., Industriel.

Grisar, Charles Godefroid, Banquier.

Hegelmaier, Paul, Oberbürgermeister a. d., früher Mitglied des deutschen Reichtags.

Helleputte, Georges, Ingénieur honoraire des Ponts et Chaussées, Ministre de l'Agriculture et des Travaux Publics, Ministre d'Etat, President de l'Association Internationale Permanente des Congrès de Navigation, Bruxelles.

Higginson, Eduardo, Consul-General of Peru at New York.

Hodges, Colonel Harry F., Corps of Engineers, U. S. Army.

Jacquinot, Ingénieur en chef des Ponts et Chaussées.

Janssen, Theodor, Regierungsbaumeister a. D., Priv. Dozent a. d. Kgl. Hochschule zu Berlin.

Kauffmann, A., Ingénieur en chef des Ponts et Chaussées.

Kautzky, Henri, docteur en droit, conseiller au Ministère du Commerce.

Keefer, G. A., District Engineer.

Kell, Hauptmann, Versuchs Abteilung der Verkehrstruppen.

Kellogg, James, Manager, Marine Sales, General Electric Co.

Kennedy, John, Consulting Engineer.

Kleymanns, Jakob, Bergwerksdirektor, Recklinghausen-Sud.

Kraus, Jacob, Dr., Ancien Ministre du Waterstaat.

Lambin, Albert, Ingénieur en chef Directeur des Ponts et Chaussées.

Lapière, Georges, Ingénieur, Membre du Conseil supérieur de l'Industrie et du Commerce.

Laroche, Charles, Ingénieur en chef des Travaux publics.

Lauda, Ernest, Ingénieur diplômé.

Leard, Johann, secrétaire ministériel Roy. hongrois.

Lefebvre, Paul François, Entrepreneur de transports.

Luneau, Edouard, Inspecteur général des Ponts et Chaussées.

Mahieu, Albert, Ingénieur en chef des Ponts et Chaussées.

Marx, Charles David, Professor of Civil Engineering.

Maxomoff, Serge, Ingénieur des voies de communication.

Menge, Dr. Alfred, Fabrikant.

Mönch, Geheimer Baurat und vortragender Rat Reichs Marine Amt.

Paratore, Dr. Joseph, Député au Parlement.

Parsons, Wm. Barclay, Engineer.

Pickands, Henry S., Chairman, River and Harbor Committee, Cleveland Chamber of Commerce.

Popp, Josef, Conseiller supérieur technique de l'autorité de la navigation maritime.

Pouzirowsky, Nestor, Counsellor of State.

Ragoczy, Egon, Syndikus a. D.

Raymond, Brigadier-General C. W., U. S. Army, Retired, General President of the Congress.

Rayner, Frank, Engineer.

Rostock, John Henry, U. S. Assistant Engineer.

Russ, Dr. Victor, Mitglied des Oester. Herrenhauses, der Staatseisenbahnrates .

Saetren, G., formerly Director of Canals.

Schott, Carl, Vorsitsender des Architekten und Ingenieur-Vereins für Niederrhein und Westfalen.

Schumann, Egön, Imperial Counsellor of State .

Schutte, Joh., Professor an der Technischen Hochschule zu Danzig.

Smedberg, Richard, Oberlieutenant im Kgl. Schwed. Wege u Wasserbaucorps.

Stenz, Joseph, Rheder.

Stephens, Major George W., President, Harbour Commissioners of Montreal.

Sternberg, Oscar, Direktor u. Kgl. Schwed, V. Consul.

Stevens, T. H. G., Burma, India.

Suarez, Senor Don Edouardo, M., Envoy Extraordinary and Minister Plenipotentiary of Chile at Washington.

Symphér, Dr. Leo, Ing. Geheimer Oberbaurat.

Szczepanizk, Johann, Ingenieur.

Troost, J. P., Directeur Général honoraire des Ponts et Chaussées.

Typaldo-Bassia, Ancien Président intérimaire du Parlement.

Van De Casteele, Jules, Industriel.

Van Der Schueren, Pierre Julien, Ingénieur Principal des Ponts et Chaussées.

Van De Velde, Joseph, Industriel.

Verschure, P. J., Président de la Société pour la favorisation
des Intérêts de la Navigation intérieure des Pays-Bas.

Vétillart, Inspecteur général des Ponts et Chaussées.

Vidal, Paul, Ingénieur en Chef des Ponts et Chaussées.

von Doemming, Albert, Oberbau-und Ministerialdirektor im Mi-
nisterium der öffentlichen Arbeiten.

Von Ferstell, Wolfgang (Freiherr), k.k. Baurat.

Wauthy, J., Président de la Chambre de Commerce de Douai.

Werkhowzow, Georges, Ingénieur des Voies de Communication.

Wittebort, G., Brussels.

Wong, Lieutenant L. W., Chinese Navy.

Wyns, Alphonse, Industriel.

PROGRAMME OF WORK

AND

NAMES OF REPORTERS

VARIOUS PUBLICATIONS

MODELS, ETC., EXHIBITED

DISPOSITION OF THE TIME

PROGRAMME OF WORK
AND
NAMES OF REPORTERS

1. Section -- Inland Navigation

A. — QUESTIONS

1st Question

Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the cases in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal.

1. **Newcomer, H. C.** — General Report.
2. **Symphér, L.** — Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the cases in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal (Germany).
3. **Lauda, E.** — Influence of the Middle-Elbe regulation on the drainage of the river Elbe below Melnik (Austria).
- 3bis. **Müller, B.** — Examination of the Question of the Possibility for the improvement of the navigability of the river Elbe, between Leitmeritz and Aussig, in Bohemia, by means of impounding reservoirs (Austria).

4. **Harts, Wm. W.** — Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the case in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal (United States).
5. **Landreth, W. B.** — Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the case in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal (United States).
6. **Kauffmann, M.** — Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the case in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal (France).
8. **de Kvassay, E.** — Canalization of hungarian rivers (Hungary).
9. **Valentini, C.** — Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the case in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal (Italy).
10. **Cockinga, R. H., Baucke, H., van Konynenburg, E. and Jonkheer van Panhuys, G. W.** — Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the case in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal (Netherlands).
11. **de Timonoff, V. E. and Kleiber, G. H.** — Improvement of the navigability of rivers having but a single current in their non-maritime portion (Russia).

2nd Question

Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of the locks.

12. **Noble, A.** — General report.
13. **Germelmann, W.** — Dimensions of the canals for heavy traffic in Germany. Principles of operating. Dimensions and equipment of the locks (Germany).
14. **Claudot, P.** — Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of the locks (Belgium).
15. **Hodges, H. F.** — Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of locks (United States).
16. **Bourgougnon, J.** — Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of the locks (France).
18. **Sanjust di Teulada, E.** — Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of the locks (Italy).
19. **Pouzirevsky, N.** — Dimensions of canals for through navigation in a given country. Principles of operating. How the locks should be arranged (Russia).
20. **Hansen, F. V.** — Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of locks (Sweden).

3rd Question

Intermediate and terminal ports. Best methods for combining, facilitating and harmonizing the transfer of freight between waterways and railways.

21. **Johnson, E. R.** — General report.
22. **Eisenlohr.** — Intermediate and terminal ports. Best methods for combining, facilitating, and harmonizing the transfer of freight between the waterway and the railway (Germany).
23. **Tomkins, C.** and **Stanford, C. W.** — Improved methods for the transfer of freight between the waterfront, the railway and the warehouse (United States).
- 23bis. **Huebner, C. C.** — Terminals on American inland waterways (United States).
24. **Mallet, P.** — Intermediate and terminal ports. Best methods for combining, facilitating and harmonizing the transfer of freight between waterway and railway (France).
27. **Tsioglinsky, M.** — Inland river ports in Russia (Russia).

B. — COMMUNICATIONS

1st Communication

Application of reinforced concrete to hydraulic works.

28. **Sewell, J. S.** — General Report.
29. **Schnapp, F.** — The use of reinforced concrete in hydraulic works (Germany).

30. **Humphrey, R. L.** — The application of reinforced concrete to hydraulic works (United States).
31. **Jacquinet, M.** — Note on the employment of ferro-concrete for structures exposed to the action of water (France).
32. **Vawdrey, R. W.** — Application of reinforced concrete to hydraulic works (Great Britain).
33. **The Hungarian State Water Survey.** — The use of reinforced concrete in hydraulic works (Hungary).
34. **Perilli, M.** — Applications of reinforced concrete to hydraulic works (Italy).
35. **Nikolsky, A.** — Applications of reinforced concrete to hydraulic works (Russia).

2nd Communication

Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation, as well as for the protection of the banks of navigable highways.

36. **Newcomer, H. C.** — General Report.
37. **Bergius, R.** — Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation, as well as for the protection of the banks of navigable highways (Germany).
38. **Marote, E. J.** and **Descans, J.** — Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation in Belgium, as well as for the protection of the banks of navigable highways (Belgium).
39. **Connor, W. D.** — The inland navigation lines of the United States (United States).

40. **Dusuzeau, L.** — Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation, as well as for the protection of the banks of navigable highways (France).
41. **Saner, J. A.** — Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation, as well as for the protection of the banks of navigable highways (Great Britain).
42. **Castiglione, A.** and **Beretta, M.** — The “Bertolini” law in respect of inland navigation in Italy (Italy).
43. **van Loon, A. R.** — Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation, as well as for the protection of the banks of navigable highways (Netherlands).
44. **Wodarsky, E. A.** — The navigable inland waterways of Russia. The present condition of the navigable inland waterways of European and Asiatic Russia, and the means employed for their improvement and development (Russia).
- 44bis. **de Hoerschelmann, E.** — Notes on a preliminary project for improving the navigability of the Dnieper cataracts, with their utilisation for motive power.

3rd Communication

**Utilization of the navigation of large but shallow rivers.
Vessels and motors.**

46. **Beach, L. H.** — General report.
 47. **Blümcke, R.** — Utilization of the navigation of large but shallow rivers. Vessels and motors (Germany).
 48. **Townsend, C. Mc.D.** — Utilization of the navigation of large but shallow rivers (United States).
 49. **Rayner, F.** — Utilization of the navigation of large but shallow rivers. Vessels and motors (Great Britain).
 51. **Merczyng, H. C.** — The utilization of the navigation of large but shallow rivers. Vessels and motors (Russia).
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IInd Section — Ocean Navigation

A. — QUESTIONS

1st Question

Means for docking and repairing vessels.

52. **Endicott, M. T.** — General Report.
53. **Mönch, H., von Klitzing, Ph. and Hedde, P.** — Docks (Dry docks, Floating docks, Building berths, etc.) (Germany).
54. **Descans, L.** — Dry docks (Belgium).
55. **Donald, J.** — Means for docking and repairing vessels (United States).
56. **Guiffart, A.** — Graving docks in course of construction in France (France).
57. **Box, E.** — Means for docking and repairing vessels (Great Britain).
58. **Egan, E.** — Means for docking and repairing vessels. The Stateowned floating dock in the harbour of Fiume (Austria).
59. **Luiggi, L.** — Slipways, Floating docks and Graving docks in italian harbours (Italy).
60. **Nobel, C.** — The problem of floating docks in Holland and the Dutch Indies (Netherlands).
61. **Treniukhinn, V. M.** — Some notes on the comparative theoretical advantages of docking large ships in dry and floating docks (Russia).

2nd Question

Dimensions to be given to maritime canals. (Technical point of view. Probable dimensions of the sea-going vessels of the future.

62. **Crunsky, C. E.** — General Report.
63. **de Thierry, G.** — Dimensions to be given to maritime canals. Technical point of view. Probable dimensions of the sea-going vessels of the future (Germany).
64. **Vander Vin, H.** — Dimensions to be given to maritime canals. Technical point of view. Probable dimensions of the sea-going vessels of the future (Belgium).
65. **Corthell, E. L.** — Dimensions to be given to maritime canals taking into account the probable dimensions of ocean ships of the future (United States).
67. **Foster King, J.** — The probable dimensions of sea-going vessels of the future in relation to the dimensions to be given to maritime canals (Great Britain).
68. **Leemans, C.** — Dimensions to be given to maritime canals. Technical point of view. Probable dimensions of the sea-going vessels of the future (Netherlands).
69. **Zamjatin, E. I.** — The growth of the size of sea-going vessels and the deepening of sea canals and ports, at their present stage of development (Russia).

3rd Question

Mechanical equipment of ports.

70. **Bensel, J. A.** — General Report.
71. **Bubendey, J. F.** and **Meyer, E. C.** — Mechanical equipment of ports (Germany).
72. **Hodgdon, F. W.** — Mechanical equipment of ports (United States).

73. **Barrillon, P.** — The mechanical equipment of ports (France).
74. **Barling, I. C.** — Mechanical equipment of ports (Great Britain).
76. **Cool, W. and de Kanter, A.** — Mechanical equipment of ports (Netherlands).
77. **Spalving, G.** — Mechanical equipment of ports. Considerations on the choice of loading and storing in ports for the export grain trade (Russia).
78. **Herrmann, A.** — On methods of loading phosphates and iron ore at Tunis harbours (France).
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B. — COMMUNICATIONS

1st Communication

High powered dredges and means for removing rock under water.

79. **Saunders, W. L.** — General Report.
80. **Blümcke, R.** — High-powered dredges. Means for removing rock under water (Germany).
81. **Hernandez, R.** — Removal of rocks below water, in Spain (Spain).
82. **Williamson, S. B.** — High powered dredges and means of removing rock under water (United States).
83. **Vidal, P.** — Very powerful dredges and arrangements for rock removal under water (France).
84. **Koch, M.** — Powerful dredgers; means for the removal of rocks under water (Hungary).

85. **Fossataro, J.** — Dredges of great power and means for rock removal under water (Italy).
86. **de Kanter, A.** and **Wesseling, H. C.** — Dredgers of great power and capacity and apparatus for removing submerged rocks (Netherlands).
88. **Sundblad, N. K.** — Description of the methods employed in Sweden in under water blasting-operations (Sweden).

2nd Communication

Report on the most recent works constructed at the more important sea ports, especially those relating to breakwaters. Applications of reinforced concrete. Means for insuring its preservation.

89. **Burr, E.** — General Report.
90. **The General Government of Algeria.** — Report on the recent and most interesting breakwaters and applications of reinforced concrete in the maritime ports of Algeria.
91. **Mönch, H.** — Report on the most recent works constructed at the more important sea ports, and especially on those relating to breakwaters. Applications of reinforced concrete; means for insuring its preservation (Germany).
93. **Bech, C., Monberg, N. C.** and **Möller H. C. V.** — Report on the most recent works constructed at the more important sea ports and especially on those relating to breakwaters. Applications of reinforced concrete; means for insuring its preservation (Denmark).
94. **Hasskarl, J. F.** — Report on the most recent works constructed at the more important sea ports, especially on those relating to breakwaters. Applications of reinforced concrete. Means for insuring its preservation (United States).

95. **Voisin, J.** — Report on the most recent works constructed at the more important sea ports and especially on those relating to breakwaters. Applications of reinforced concrete; means for insuring its preservation (France).
96. **Carey, A. E.** — Recent works at important sea ports and reinforced concrete as applied to this (Great Britain).
97. **Inglese, I.** and **Luiggi, L.** — Works going on for the construction of a new breakwater in the port of Naples (Italy).
98. **de Blocq van Kuffeler.** — Report on the most recent works constructed at the more important sea ports and especially on those relating to breakwaters. Applications of reinforced concrete; means for insuring its preservation (Netherlands).
100. **Lundberg, A.** and **Fellenius, W.** — Report on the recent works in the most important Swedish sea ports (Sweden).
101. **Herrmann, A.** — Account of work carried out in the principal sea ports of Tunis (France).

3rd Communication

Bridges and ferry bridges; tunnels under waterways used for ocean navigation. Economic and technical study.

102. **Burr, W. H.** — General Report.
103. **Wendemuth.** — Bridges and ferry bridges; tunnels under waterways used for ocean navigation. Economic and technical study (Germany).
104. **Zanen, F.** and **Descans, L.** — Methods of communication between the shores of maritime waterways (Belgium).
105. **Lindenthal, C.** — On the means of crossing wide and deep waterways (United States).

106. **Babin, Coblentz and Tartrat.** — Bridges and ferry bridges; tunnels under waterways used for ocean navigation. Economic and technical study (France).
107. **Forti, A.** — Bridges, ferry bridges, tunnels under waterways used for ocean navigation (Italy).
108. **Rojdestvensky, A.** — Bridges and ferry bridges. Tunnels under waterways used for ocean navigation. Economic and technical study (Russia).
109. **Nilsson, E. J.** — Bridges and ferry bridges. Tunnels under waterways used for ocean navigation. Economic and technical study (Sweden).

4th Communication

Safety of navigation. Lighted buoys.

110. **Putnam, C. R.** — General Report.
 111. **Braun.** — Lighted buoys on the Prussian coasts (Germany).
 112. **Millis, J.** — Safety of navigation on the great american Lakes (United States).
 113. **de Joly, C.** — Safety of navigation. Lighted buoys (France).
 114. **Stevenson, D. A.** — Lighted buoys as aids to navigation (Great Britain).
 116. **van Braam van Vloten, P.** — Communication on the lighting of the Dutch coasts (Netherlands).
 117. **de Schokalsky, J.** — Safety of open sea navigation (Russia).
 118. **Crönvall, U.** — New methods for the automatic lighting of lighthouses, lightships and light-buoys in Sweden (Sweden).
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VARIOUS PUBLICATIONS

Publications of the Organizing Commissions

Philadelphia and Vicinity.

The great lakes of North America and the Far West.

The Port and City of Philadelphia.

Pennsylvania and its manifold industries.

Monthly Bulletins : december-january-february-march-april.

Journal of the Congress : Nos 1, 2, 3, 4, 5, 6, 7.

Technical program of the Congress.

General program of disposition of the time.

List of persons to whom Congress Cards of Membership have been issued.

Publications of various administrations and corporations

Relief Map of the Panama Canal.

Relief Map of the United States.

The New York State Barge Canal.

Duluth and the Iron Ranges of Minnesota.

Canada : her natural resources, Navigation, principal steamer Lines, and transcontinental Railways. Issued by the Department of Marine and Fisheries, Ottawa.

The New York Improvement and Tunnel extension of the Pennsylvania Railroad.

Notes on the improvement of the Harbors and connecting Waters of the Great Lakes, by Colonel C. McD. Townsend, Corps of Engineers, U. S. A.

Synopsis of Flood Commission Report, Pittsburgh, 1912.

Report of Connecticut Rivers and Harbors Commission, 1910.

Official handbook of the Panama Canal.

Report accompanying general description of the Harbor of New York.

Barge Canal Bulletin, June, 1910.

Anchorage Regulations, Harbor of Philadelphia.

Trip of Inspection around New York Harbor. Plan général avec notice.

The port of Boston.

Boston (Booklet of illustrations).

Map of Boston Harbor.

Boston Harbor inspection trip.

Several pamphlets descriptive of the Cape Cod Canal.

"Summer excursion Routes, Pennsylvania Railroad System".

Cleveland Harbor problem (discours du Col. John Millis, Corps of Engineers, J. S. Army).

Report upon the improvement of rivers and harbors in the Cleveland, Ohio, district, par John Millis, Colonel, Corps of Engineers, U. S. Army, in charge, 1911.

Cleveland Marine Review, Numéro de Juin 1912.

The Great Lakes. Discours de M. Harvey D. Goulder, de Cleveland.

Excursion, Fourth Avenue subway, Brooklyn, N. Y., June 5, 1912. Bradley Contracting C°, Contractors.

Engineers' Report on the Intra-Coastal Waterway, Boston. Mass. to Beaufort, N. C.

New Jersey, Notice.

Preliminary Report of the New Jersey ship Canal Commission. Bulletin, Atlantic deeper Waterways Association May, 1912.

Map of Hudson River, New York to Albany.

Buffalo Harbor, N. Y. Breakwater.

St. Mary's falls Canal, Michigan. Statistical Report of Lake Commerce, prepared under direction of Colonel C. McD. Townsend, Corps of Engineers, U. S. Army.

Pennsylvania Railroad, Guide to Washington.

The Detroit, Spokesman of Optimism, published by the Detroit Board of Commerce.

Gray's aero view of the Panama Canal.

Signaux sous-marins.

American gasaccumulator C°. Automatic buoys, Beacons and Lighting equipment for Lighthouses and Light-vessels.

Carnegie Steel C^o, Pittsburgh, Pa. Notice.

The Erie Michigan Canal. Preliminary data and profiles along the various proposed routes by Wm. E. Harris.

Annual report of the State Engineer and Surveyor of the State of New York, Albany, 1912.

Westinghouse views.

Map of St. Laurence River-Montreal and Quebec.

Lockport-Electrical and industrial.

Trenton-Historical and industrial.

Old Company's Lehigh.

Descriptive itinerary of trip to South Bethlehem and the Anthracite Coal Regions.

Manual of steam Shovel Work.

The XIIth International Congress of Navigation, 1912. Presentation number of the New York Maritime Register.

Itinerary-Philadelphia to Chicago.

Tour to Washington, Harrisburg and Pittsburg.

New System of Construction for Dikes and Breakwaters, by Jose M. Fuster.

Statement of rank, duties and addresses of officers of the Corps of Engineers, U. S. Army.

Saint Paul, 1909-1910.

Albany-Notice par la Cnambre de Commerce d'Albany, N. Y.

The Challenge of the Mountains, Canadian Pacific Railway.

Through Wonderland, Yellowstone National Park (Northern Pacific).

Where gush the Geysers- Yellowstone National Park (Union Pacific).

Travaux du Port de Bizerte et de l'Arsenal de Sidi-Abdallah, par M. Jean Hersent, Ingénieur civil.

Aga aids to navigation.

Applications du béton armé aux travaux hydrauliques, par Juan Manuel de Zafra, Ingénieur, Professeur.

Lisbonne et Portugal.

Deutsche Schiffahrt-Sonderausgabe, Mai, 10, 1912.

MODELS, ETC., EXHIBITED

Sectional working model of typical lock and machinery Panama Canal—Scale : $\frac{1}{2}$ inch to 1 foot.

Working model of Pedro Miguel locks. Scale : 1 in. to 20 ft.

Models of three vessels. Scale : 1 in. to 20 ft. To be used in connection with last named model, to illustrate size of locks as compared with the size of vessel. The models represented the following ships : United States Battleship *New York*, S. S. *Olympic* of the White Star Line, and S. S. *Cristobal* (an average sized freight steamer).

Model of Gatun Dam and locks. Scale 1 in. to 100 ft.

Relief map of the Isthmian Canal Zone.

Large working model, showing typical sections on New York State Barge Canal at various points, river canalization, movable dam, earth section, lock section and canal terminal, with barges of the present and proposed size in place.

Model on larger scale of one of the movable dams on the Mohawk River, with adjoining lock.

Large colored relief map of the entire Barge Canal route.

A Sperry Gyroscopic Compass.

Large model plan of the city of Philadelphia with proposed Parkway, Boulevard and Harbor improvements.

Two models to larger scale of proposed Parkway connecting City Hall, Philadelphia, with Fairmount Park, and the Schuylkill River.

Series of colored pictures of passenger steamers on the Hudson River.

Series of panorama views of the Harbor of Philadelphia.

Series of Panorama views of the Port of New Orleans.

Series of models to uniform scale ($\frac{1}{8}$ in. to 1 ft.) of commercial ships at all periods of history, from the most ancient to the present time (exhibited by Commercial Museum).

Series of over 100 colored maps showing political and commercial conditions at continuous periods of history; with samples of articles of international trade at periods corresponding to those of the said maps (exhibited by Commercial Museum).

Collection of bromide enlargements showing revolution of transportation from the most primitive to the most modern conditions, human burdens, animal burdens, animal drawn vehicles, steam railways, automobiles, areoplanes also water transportation (exhibited by Commercial Museum).



BELLEVUE STRATFORD HOTEL, PHILADELPHIA
(Headquarters of the Congress)

DISPOSITION OF THE TIME

Wednesday, May, 22.

10.30 A.M. — Meeting of the Permanent International Commission at Bellevue-Stratford Hotel.

2.30 P.M. — Automobile trip around Philadelphia.

9 P.M. — Informal reception at the Mayor's Office by the Mayor and his Cabinet.

Thursday, May, 23.

10.30 A.M. — Opening session of the Congress at Metropolitan Opera House.

2 P.M. — Meetings of the Sections at Bellevue-Stratford Hotel.

1st Section : Discussion of the 1st Question.

2nd Section : Discussion of the 1st Question.

5 P.M. — Visit of the special Navigation Exhibition in the Commercial Museum.

8 P.M. — Theatre Party, Keith's Theatre.

Friday, May, 24.

Alternative excursions in accordance with the special programs :

a) To Trenton.

b) To South Bethlehem and Anthracite Coal Region.

Saturday, May, 25.

9.30 A.M. — Meetings of the Sections at Bellevue-Stratford Hotel :

1st Section : Discussion of the 2nd Question.

2nd Section : Discussion of the 3rd Question.

2 P.M. — Meetings of the Sections at Bellevue-Stratford Hotel :

1st Section : Discussion of the 3rd Question.

2nd Section : Discussion of the 2nd Question.

8. P.M. — Smoker at Bellevue-Stratford Hotel.

Sunday, May, 26.

Alternative excursions in accordance with the special programs :

a) To Atlantic City.

b) To Cape May.

Monday, May, 27.

9.30 A.M. — Meetings of the Sections at Bellevue-Stratford Hotel :

1st Section : Discussion of the 1st Communication.

2nd Section : Discussion of the 1st and 4th Communications.

2 P.M. — Meetings of the Sections at Bellevue-Stratford Hotel :

1st Section : Discussion of the 2nd and 3rd Communications.

2nd Section : Discussion of the 2nd and 3rd Communications.

7 P.M. — Grand Banquet of the Congress at Bellevue-Stratford Hotel.

Tuesday, May, 28.

9.30 A.M. — Closing session of the Congress at Bellevue-Stratford Hotel.

EXCURSIONS

In the evening of Tuesday, May, 28, departure, in accordance with the special programs, for the excursion to Washington, Harrisburg and Pittsburgh, terminating at Philadelphia, Sunday, June, 2.

June, 3, A.M. to June, 14, P.M. — Excursion, in accordance with the special programs, to Chicago and to Canada, via New York.

MINUTES OF THE MEETINGS



OFFICIAL OPENING OF THE XIIth INTERNATIONAL CONGRESS OF NAVIGATION
 BY HIS EXCELLENCY WILLIAM H. TAFT, PRESIDENT OF THE UNITED STATES, ON MAY 23rd, 1912,
 AT THE « METROPOLITAN OPERA HOUSE » AT PHILADELPHIA

MINUTES
OF THE
FIRST GENERAL MEETING
(OPENING SESSION)

Thursday morning, May 23, 1912.

It was in the large hall of the Metropolitan Opera House at Philadelphia, and at eleven o'clock in the morning, that the formal opening of the XIIth International Congress of Navigation was held on May 23, 1912, the Honorable J. Hampton Moore, Chairman of the Local Committee on Organization, presiding.

His Excellency, Mr. William H. Taft, President of the United States and High Protector of the Congress, had made it a point to honor the meeting with his presence. The President of the Republic who, with members of the Diplomatic Corps and high officials of the Government, had arrived from Washington by special train, was escorted through the City, from the station to the Opera House, by the City Troop of Cavalry and the Mounted Police and was accompanied by a long procession of automobiles in which the notabilities of the city and the delegates from foreign Governments had taken their places.

A large number of persons had collected in the hall which was decorated with the flags of all the nations represented at the Congress. The assemblage, which was particularly brilliant, was composed of more than 3,000 persons, and many ladies in the boxes added by their presence to the beauty of the ceremony.

It was in the midst of lively enthusiasm and the sound of cheers that President Taft was escorted to his place at the table of honor which had been placed for this purpose on the stage.

The following gentlemen were also seated at this table :

Brigadier General William H. Bixby, Chief of Engineers, United States Army, President General of the XIIth Congress;

Hon. Rudolf Blankenburg, Mayor of the City of Philadelphia;

Mr. J. C. Bell, Attorney General, representing the Hon. J. K. Tener, Governor of the State of Pennsylvania;

Mr. V. E. de Timonoff, Ex-President General of the XIth Congress, Acting-President of the Permanent International Association of Congresses of Navigation;

Freiherr von Coels von der Brügghe, Assistant-Secretary of State in the Ministry of Public Works of Prussia;

Mr. A. Charguéraud, Councillor of State, Inspector General of the Ponts et Chaussées, Director of Roads and Navigation in the Ministry of Public Works of France;

Colonel John Bogart, Consulting Engineer, Chairman of the First Section, Member of the General Committee on Organization of the XIIth Congress;

Mr. E. L. Corthell, Consulting Engineer, Chairman of the Second Section, Member of the General Committee on Organization of the XIIth Congress;

Lieutenant-Colonel J. C. Sanford, Corps of Engineers, United States Army, Secretary General of the XIIth Congress; Member of the General Committee on Organization and of the Executive Committee;

Mr. J. Richald, Secretary General of the Permanent International Association of Congresses of Navigation, Member of the Executive Committee of the Association;

Mr. William T. Tilden, Vice-Chairman of the Local Committee on Organization;

Mr. George F. Sproule, Secretary and Treasurer of the Local Committee on Organization.

Back of the table of honor were the members of the Diplomatic Corps and of the Consular Services, Senators and Representatives, official Delegates of foreign Governments as well as members of the Committee on Organization and the Officers of the Sections of the Congress.

It was with deep regret that the meeting had to deplore the absence of Brigadier General Charles W. Raymond, United States

Army, Retired, President of the General Committee on Organization and First President General of the Congress, who was prevented by serious illness from being present.

A military band lent its assistance to the festival and, after the last piece was played and silence reigned in the hall, Mr. **Hampton Moore** declared, in English, the Congress opened in the following terms :

Ladies and Gentlemen,

Philadelphia is honored above all her sister cities in welcoming to America, for the first time, the International Congress of Navigation.

The twelfth Convention of this body of the New Constructors and Engineers of the World comes to Philadelphia under the high patronage of the President of the United States. It has the sanction and the encouragement of the Governor of the great Commonwealth of Pennsylvania and of the Mayor of the City of Brotherly Love. (*Applause.*)

It is intended that a cordial Philadelphia, Pennsylvania, American welcome shall be extended to these representatives of all the great nations of the earth.

Philadelphia is so fortunate that it is able to offer, through its Mayor, a welcome in three languages and I have now the honor of presenting, for the deliverance of an address of welcome in French, in German and in English, his Honor, Rudolph Blankenburg, Mayor of Philadelphia. (*Applause.*)

Mayor **Blankenburg** first extended a welcome in French, in the following words :

Mr. President, Ladies and Gentlemen, Members and Guests of the Twelfth International Congress of Navigation :

I salute you and wish you welcome to Philadelphia, the city which we love to call the City of Brotherly Love. Please bear in mind, however, that we do not except sisterly love. We are cosmopolitan; we embrace all sexes, all races, all nations, the whole world.

Our city was founded by William Penn in 1682, by treaty with the Indian aborigines, who lived along the banks of the Delaware River, and it is said that this is the only treaty between Christians and Indians which has never been violated by the contracting parties.

Philadelphia is a young city as compared with London, Paris, Vienna, Berlin or Rome, but, in spite of our youth, our city is one of the ten most densely inhabited capitals of the world. We have 1,600,000 inhabitants who live in 342,000 dwelling houses. Nearly 200,000 of these houses are of two stories and there are only 100,000 of three stories. The Philadelphia workmen are better housed than those of any other city; they have baths, hot and cold water, gas or electricity and many other conveniences. Taking all the houses, large and small, into account, there are less than five dwellers per house.

But I will not bore you with figures. I believed merely that this mention would explain why Philadelphia has received the name of the Domestic City, the City of the Home.

I assure you, Ladies and Gentlemen, that we are highly honored and gratified by your visit and we hope that you will carry away with you pleasant and lasting impressions of our city and of its inhabitants.

Speaking in German, Mayor **Blankenburg** said :

Mr. President, Ladies and Gentlemen, Members and
Guests of the Twelfth International Congress of Navigation :

A special pleasure has fallen to my lot in being able to greet and welcome the Delegates and Guests who have come from our dear, old native land, as well as all those who understand our dear mother tongue.

You will find here much that is strange and yet the population of Philadelphia is such that, in some parts of the city, one would almost think that one was in Germany. It is a beautiful fact that, although the German-American is one of the most loyal citizens of our great Republic, he never loses his love of and his attachment to the old father-land. This is one of the surest guarantees which

promise well for everlasting peace between the two great nations. The moral influence of the many millions of our fellow citizens of German descent, spread abroad through the whole land, would make a war well nigh unthinkable, and a war alliance with any European power against Germany an impossibility.

As one of German birth, I draw your attention with pride to what Philadelphia owes to her German citizens. The "Drexel Institute" educates every year thousands of young people and prepares them for life; it was founded by the son of a German and is endowed with ample means for all time. The "Widener Home" for crippled children is provided with millions and will make life easier for countless unhappy little ones. Its founder was also the son of a German. Wanamaker's "Bethany Mission", one of Philadelphia's institutions, has led thousands and thousands into the right path. Wanamaker is the son of a German. The German Hospital, one of the best in the whole country, was founded by Mr. John D. Lankenau, a citizen of German birth; it is the pride of our city and known throughout the world. The whole of the founder's great wealth is dedicated to this hospital for all time.

This shows that the German in America does not forget his duty to mankind.

You will see much and receive new impressions and my wish is that you may take away with you most charming memories to the old mother country, and what I can do to contribute to this I offer you with my whole heart.

Finally, Mayor **Blankenburg** spoke in English as follows :

Mr. President, Ladies and Gentlemen :

"As Chief Magistrate of Philadelphia, Mother City of the Republic, I take great pleasure in extending to you the heartfelt welcome of all its people, and in the name of both Government and people, express our high satisfaction in being thus honored by your presence. You have hitherto gathered at some one of the great European capitals, and your coming here to discuss subjects of momentous importance to the whole world is another one of those multiplying evidences, in which contemporary history

abounds, that we are more and more nearly approaching that ideal condition which the poet describes as 'the brotherhood of man, the federation of the world.'

" You come here to Philadelphia, a city regarded in the New World as linking the Republic with the far-away past ; a city with a corporate existence going back more than two and one-quarter centuries ; and yet, gentlemen, you represent—many of you—countries in whose eyes Philadelphia, two and one-quarter centuries old, is a mere babe in arms. Going back to the discovery of America and taking the continent as a whole, it staggers the mind to realize that even in 1492, more than a thousand years had elapsed from the time when Rome ruled the world and had reached her highest point of civilization, while that far-distant date was separated by over two thousand years from the climax of Egyptian art and civilization. To us in America, therefore, you bring by your visit a realization that we are merely in the morning hours of life ; that the whole great day of development lies still ahead of us. While a certain humility is born of this realization of our youth and inexperience, there comes with it, gentlemen, a certain sense of satisfaction in recalling the things which we as a people have been able to accomplish during the short period of our national life.

"You represent great scientific development all over the world ; you illustrate the power of mind to utilize the gifts of a kind Providence to the benefit of mankind. You represent the truth that the science of government must take cognizance of the powers of science ; you come from the older civilization in the older world beyond seas. You come to inspect our works, to measure our performances as they should be measured, fully and fairly ; but it is only right that in passing judgment, you should bear in mind the fact that our whole great development along those lines in which you are most deeply interested has been practically the work of only a century.

"It is right that I should bid you welcome to Philadelphia ; fitting that, as the representative of authority in the city which promulgated the Declaration of Independence, I should welcome here representatives of other and older forms of government. For no serious student of world history will challenge my statement when

I affirm that the Declaration of Independence, prepared in this city, has mitigated conditions of mankind all over the world and has been a distinct and, in some degree, a directing influence in the changes which have taken place in every government on earth. The tie, therefore, of this abstruse agency binds the whole world to America and through America to Philadelphia, the city of the Declaration of Independence and the Constitution of the United States. For that Constitution, also, has proved a model, either in the whole or in some of its parts, for constitutional enactments in nearly every other country of the globe.

"But there is a further, and perhaps a deeper reason why there is the element of appropriateness in my standing here to welcome you visitors from abroad. You come from all lands, all advancing peoples. Our country is great because its population has been drawn from all lands and all advancing peoples, and the men who have come here have, we believe, developed, under our freer institutions, more rapidly than they would have developed at home.

"Gatherings of representatives interested in any special line of work bring a benefit not merely to the people concerned in the particular convention or gathering, but to the city in which they are held. Such gatherings go to the formation of our great university extension education, by means of which the public are interested and educated in a wide range of subjects.

"Your meeting in Philadelphia is the first public recognition of America by a highly scientific international body—a body of men composed not merely of scientific experts, but of scientific experts who, in many instances, are coincidentally governmental executive officers and charged with the conduct of great works and undertakings. Now, in the year of grace 1912, your great body of scientists and experts has crossed the seas and will hold deliberations on important questions, many of which have direct bearing upon present day movements in Europe, here in the Mother City of the new Republic.

"With best wishes for every conceivable success for your deliberations, I repeat, gentlemen of the Conference, you are welcome, doubly welcome, to our loved City of Philadelphia."

The Governor of the State of Pennsylvania, Hon. J. K. **Tener**, was then to have spoken, but, as he was kept away by health reasons and was unable to be present, the address which he had intended to deliver was read, in English, by the Hon. **John C. Bell**, Attorney General of the State, as follows :

Mr. President, Ladies and Gentlemen :

"In looking forward to this meeting, two thoughts have been uppermost in my mind. The first is to extend to you the best hospitality of the Commonwealth and her citizens.

"The occasion calls to mind that epochal event in the Autumn of 1682, when William Penn sailed up the noble Delaware in his good ship 'Welcome' and took possession of his vast domain, Pennsylvania and, in this City of Brotherly Love, sowed the seeds of popular government in America. In the spirit of peace and civil liberty which he personified, and for which the Commonwealth still stands, I give you its most cordial greetings and best welcome.

"My second thought is, of course, a practical one. The meeting, in this International Congress, of the leading waterway engineers, maritime experts and foremost students and authorities of the world upon inland and ocean navigation, and the scientific discussion and broad interchange of views on the great practical problems connected therewith, must necessarily be of incalculable benefit to all concerned.

"With respect to ocean navigation, our Commonwealth is not so vitally interested as in the discussion of the problems of inland navigation. It is interesting to note, however, in passing, that it was in this city that Betsy Ross made the first American flag, and that the first recognition of it by a foreign government was in the harbor of Quiberon, in 1778, on the United States ship 'Ranger', commanded by our naval hero, Paul Jones.

"Pennsylvania may to-day be said to have four great inland waterway problems. I allude, of course, to the Delaware, Lake Erie and Pittsburgh problems, and, lastly, to that of our inland rivers and streams. Woven into the proper consideration and solution of these problems are questions of a technical and scientific nature, involving, also, vital questions with respect to the social, industrial and commercial welfare of our citizens.

"Having regard to the Delaware, I am looking forward to the time when, as a result of the joint appropriations of the city, State and nation, her channel will be deepened to 35 feet and her wharves and docks will be built up like those upon the Mercy and the Thames, and we shall have piers the equal of those in New York harbor.

"I have noted that one of the questions to be discussed in your Congress is the use of re-inforced concrete in the construction of these great waterway improvements. Modern experience has, I believe, demonstrated that concrete is the material best adapted for such construction; and this event in your programme impressed itself upon my mind because it is well known that no State in the Union is better equipped for the manufacture and supply of such construction materials than is Pennsylvania.

"In 1907 the Legislature appropriated \$150,000 for the construction of a new public wharf at the city of Erie, on the lake of the same name. In greatly increasing the freight and passenger business at that port, the erection of this wharf has been of most marked commercial benefit to that city. It should be the State's policy to build other like wharves, and to co-operate with the United States Government in deepening the channel of the Lake. Here, too, I may also note, that our patriotic pride finds another inspiration in the recollection of Perry's great victory, the centennial of which we are soon to celebrate.

"So, too, the City of Pittsburgh is vitally interested in her inland waterway problems. For many years the City Councils, the Board of Trade, and public spirited citizens generally, have been advocating the building of a great canal between Erie and Pittsburgh; also the proper dredging of the tributary rivers of the Ohio, and the scientific construction of docks and the prevention of floods along these rivers. And it has been pointed out that these improvements, with the contemplated canalization of the Ohio River, would add greatly to the commercial and industrial supremacy of that city, for it would make it a distributing centre for all the great products of its mills and manufactories by these waterway systems, leading alike, by way of the Ohio to the Mississippi Valley, and via the canal and through the Great Lakes to the sea.

"With respect to our inland rivers, the State, by the organization

of the Department of Health and the Water Supply Commission, has committed itself to the public policy of supervised utilization and conservation of these inland streams, and the preservation of their purity.

"I believe that we should enlarge the power, authority and duties of the Water Supply Commission, so as to provide for the supervision and regulation of the erection, maintenance, inspection and safety of all dams, reservoirs, embankments and obstructions of any kind heretofore or hereafter erected or maintained, in, across or along any of these rivers and streams.

"In the discussion and consideration of the questions of inland navigation, I know that our engineers, experts and delegates interested in these problems, as affecting this Commonwealth, and the people generally, through the newspapers reporting such discussions, will, one and all, derive great aid and benefit from the assembling of this Congress, which, assuredly, will shed upon such questions all the light which the advanced scientific knowledge and the experience of the present day afford.

"And I may be permitted to add that if there is any one of the State's problems which is possibly of more vital importance and demands more immediate attention than the others, it is that in which is centered the discussion of the questions connected with the deepening of the Delaware, and the planning and construction of its wharves, docks and piers. Perhaps this city may never become a great passenger port like New York, but it nevertheless has all the natural facilities and advantages for one of the greatest, if not the greatest, freight port in America. Time was, indeed, when the commercial pre-eminence of Philadelphia was universally recognized. Ship building and trade with the West Indies and England were among the first occupations of the Colonists. Commerce grew steadily and rapidly through all the Colonial period; and, as an eminent writer has observed, its success continued after the Colonists became independent. Philadelphia arose to be the common emporium of the United States.'

"As a result of her great commercial transactions, she produced Robert Morris, the financier of the Revolution, and Stephen Girard, the greatest mariner and merchant of the first half of the nineteenth century. The same author observes that, Philadelphia had her

India wharf at Walnut street,' and the list of places regularly visited by her ships included nearly all the commercial marts of the world.

"There is no reason, that I can see, why Philadelphia should not regain this commercial supremacy, and the holding of this Congress here should prove an inspiration toward this desired end. "

After the delivery of the above address the Chairman introduced the **President of the United States** who was enthusiastically greeted by the assembled company. In the midst of lively applause, the large audience rose and waved their handkerchiefs in what is known as the "Chatauqua" salute.

President Taft spoke as follows :

Mr. Chairman, Mr. Mayor, Mr. President, Mr. Ambassador, and the Representatives of Foreign Nations, Ladies and Gentlemen :

"It gives me great pleasure to attend any Congress that is for the promotion of the peaceful arts between the nations of the world. We have been trying to do something in the matter of bringing about universal peace in this country, and we have had the assistance of foreign nations in that matter. For the time being we are suffering a little halt, but I wish to say to the representatives of foreign nations abroad that the hearts of the American people beat high for every step toward universal arbitration and peace and the abolition of any method of settling international controversies save by peace and by judicial decision.

" I am delighted, on behalf of the people of the United States, to welcome the foreign representatives here, in this international navigation congress. I congratulate them on having selected this, the natal city of the nation, for their congregations. The universality of the tongue of the Mayor is only indicative of the breadth of the hospitality that you will enjoy here.

"It has been said that there is something perhaps for you to be interested in in this country in the development of the engineering problems of navigation. Certainly there is much that you can confer upon this country in the advance which has been made, in other

countries than this, in the use of navigation. Perhaps in the mere engineering problems of treating rivers and streams and lakes we do not suffer in comparison with other countries. But there are certain phases of the navigation problem that to us are most important and in respect to which, I do not think I state it too strongly when I say, we are very backward. As a nation we like to go fast. When the railway came in, the slower navigation of the river and the canal and the lake did not attract us so much, and you who go more deliberately, more thoroughly, possibly, more scientifically, were able to unite the advantages of water transportation with railway transportation in such a way as to use both to the height of their usefulness. We have yet to learn much from you in the classification of articles to be transported, so that those that are bulky, that naturally pay only a small freight, and may be transported without injury to the interests involved in a very slow way, may be assigned to the rivers and the canals, while that freight that needs quick dispatch may be assigned to the railways and pay a higher rate in accord with the expense of the transportation. Now we have to unite the two. We have to learn how to unite the two methods of traffic by railway and by canal and by river. We are greatly lacking in that kind of terminals that are necessary in order to make the two operate economically, usefully and rapidly, and all those things I doubt not that our representatives in your Congress may learn of and profit by from the experience of the older countries of Europe. We have, it is true, one waterway on the lakes that perhaps does a greater business than any waterway in the world, and what we have to learn is that the use of waterways must be more or less adapted to the circumstances that surround those waterways and must, in the nature of things, govern their use. That is: that you must have at one end of the waterway something to be carried to the other end, and then at the other end something to be carried back to the first place. If you haven't either, and put a waterway there, it is not going to furnish its own transportation. But, that transportation by waterway may be facilitated by a proper division of freights, and by proper terminal and connection facilities, I doubt not, and I suppose it is not the subject of dispute, but we have to be patient, and we are not very patient in the United States. If we do not get a traffic which

we think ought to be there, in some way or other we want to put it there and that is not a profitable business.

"Now, my friends, I could wish very earnestly that this city of Philadelphia were nearer to the great engineering work of navigation which this nation is engaged in at Panama. I am sure that the foreign representatives, as indeed everybody at all interested in the execution of an enormous work, would revel in the pleasure he would find in spending a week on that narrowest part of these two continents; and I mention that for two reasons only—one to note the fact that when we desired information with reference to that great work in advance of its execution, we invited from the European countries a commission of skilled engineers to help us with their suggestions, and they responded in a way that I shall always feel grateful for, because I was at that time at the head of the War Department, in which that commission sat. We have gone on with the work, and I am glad to say that it will be fully completed—certainly within eighteen months.

"As in the execution of all such great works, we have made a good many discoveries, we know now a great deal more than we knew then. One of the natural lessons is the expansion of cost, and that which was projected at less than \$200,000,000 will cost us about \$400,000,000. That is due not alone to the increased cost per unit, but also to the expansion of the ideas of those who were responsible for its construction in enlarging it and making it more suitable to possible growth of trade.

"We speak generally of the Panama Canal and hardly realize that when De Lesseps first planned a canal across that Isthmus it was to be but 72 feet wide and 28 feet deep. Now the canal at its narrowest point is 300 feet across the bottom, and reaches out into the lake, and there has a channel of 1,000 feet, for more than two-thirds of its length, with a depth of 45 feet. The width of the locks is now more, being 110 feet, considerably more than the canal was to be under the first project of Mr. De Lesseps. The canal has also settled a controversy, that we assumed the responsibility for deciding in advance, and I think has settled it in favor of those who rendered the decision. That is, that a sea level canal would have been impossible, at least practically impossible; that the conditions are practically prohibitory. The slides which have occur-

red in the Culebra Cut, the enormous quantities of water that have discharged themselves through the Chagres River, all show that the time which would have been taken and the money which would have had to be expended in order to complete the canal as a sea level canal would have been so great that even the energy of the American people would have halted and their interest would have lagged in view of the length of time that the work must have dragged on. Now it is a practical canal. It is one that will pass any vessel through it that is either on the ocean or projected, and unless the American people take some other course than they have heretofore adopted, in respect to the merchant marine, they are not going to have much interest except by way of laying tolls on the merchant marine that goes through there. I hope that some other course may be taken in respect to our foreign merchant marine that may proportion our use of it to the expense and energy and time and effort that we spent in its construction.

"Of course, the coastwise trade will be a very important trade to us, and the union between the Atlantic and the Pacific seabords is perhaps to us the most valuable result of the canal. On the other hand, I hope the distinguished gentlemen whom I address will believe me when I say that the construction of this canal by the United States at its sole expense is an evidence of the willingness of the United States to do something for the welfare of the world, and that it is a fitting monument to the growth of this country, which had its birth in this city in 1776, from a straggling series of colonies of 3,000,000 people to a present population of upwards of 100,000,000; that it shows that that which Charles V had in mind when he first heard of the Isthmus, has finally been developed, under the leadership and the ingenuity and energy of France, by the American nation, which is always willing to follow a good suggestion, and that it will be regarded as a substantial evidence of the desire of the United States to make closer our relations with all the world, and to show to those who are here now as foreign representatives that there is a moving element among the American people who are determined to accept every evidence of brotherhood in you toward us and to show you the same feeling on our part toward you until we shall have reached a point when we can discard all battleships and meet as brothers, and without the thought of any controversy."

Next in order was introduced Brigadier General William M. **Bixby**, Chief of Engineers, United States Army, who spoke as follows :

Mr. President of the United States and members of the Foreign Diplomatic services, Senators and Congressmen, Governors of States, Mr. Attorney General of the State of Pennsylvania on behalf of the Governor, Mr. Mayor of the City of Philadelphia, Ladies and Gentlemen of the Local Organizing Commission and of the City of Philadelphia, patrons, delegates and members, both Ladies and Gentlemen of the International Navigation Congress, and honored guests of the Congress.

"It is with much pleasure, and with high appreciation of the importance of the occasion that I stand here before you as representative of the General Organizing Commission of the Twelfth International Congress of Navigation, and of the American Section of the Association and, as an intermediary, to welcome the Association as a whole to United States soil and to express briefly the thanks of the United States Section of the Association for the hearty support received from the Local Organizing Commission, from the City of Philadelphia, the State of Pennsylvania, the adjoining States, the various cities of the Eastern United States and of Canada, and last, but not least, from the United States Government through its own Congress and its Chief Executive, the President, acting for the whole United States public.

"In olden days the advancement of any art was mainly due to the exertions of a few gifted individuals, who restricted their works to developing the interests of a single locality or of a small body of people. But of recent years, all people are realizing that the best progress is made only by extending the field of research beyond its local surroundings and by combining the best work of all localities, all peoples, and all countries. The trend of modern times appears to be, and happily so, a movement toward a standardization, based on the best methods of the entire world, toward an international treatment of all commercial and technical work, toward a day when navigation shall be customary by air as

well as by water, and the use of boats and ships shall be for peaceful purposes alone, and toward a world progress based upon a peaceful, harmonious and correspondingly advantageous and effective international cooperation, where the best defence of one nation against another shall be the strength of their mutual commercial and personal interests.

"In such international co-operation, the United States, by reason of its youthful position amongst nations, starts late; but we are desirous of taking our part in all such work, bringing to it the enthusiasm of youth. All we ask for from the rest of the world is that they shall visit us oftener, know us better, and allow us to join with them to the full extent of our growing powers. In return we hope and expect to reciprocate in every way. It is from such a point of view that the American Section of the Association rejoices in the visit to this country of the foreignly organized Association of Navigation Experts and Investigators, and rejoices at the hospitable welcome which it is already receiving from Philadelphia, and which it is certain to receive later from the rest of the American public."

It was Professor **de Timonoff** who, acting as President of the Permanent International Association of Congresses of Navigation replied, in the name of this body, to the addresses of welcome which had been spoken.

Professor de Timonoff made his reply in English as follows :

Your Excellency, Mr. Chairman, Ladies and Gentlemen :

The Presidents of the Permanent International Association of Navigation Congresses, Messrs. Helleputte and Dufourny, have been unfortunately prevented from coming to this country. They deeply regret it and apologize for not being able to be present at this important meeting, which they would have been so glad to address, with all their well-known—I may say "world famed"—powers of oratory.

"In their absence, I have been highly honored by the invitation of the Permanent Board of the Association of Navigation Congresses to act as President of this Association during its session

in Philadelphia. This honor involves a responsibility for which I must ask all your indulgence.

"It has often been stated that nationalism was the miracle of the last century. The unification of peoples along race lines into recognized nations has indeed been a marked characteristic of the nineteenth century. The twentieth century seems likely to be distinguished for internationalism. The evident tendency is now toward international organization in order to centralize under a common control and to administer for an international purpose the various unions which have sprung into existence within the last generation. The movement drawing the nations into close relation is principally unofficial and due to the initiative of associations, with the encouragement, although not under the control, of any government. The consequences of this movement are of the greatest value to the nations themselves, not only from the standpoint of special problems, but, in general, because the nations must necessarily be influenced by the movement toward unity of action in international matters.

"Without stopping to inquire what causes are making this movement possible, whether they are of a permanent character, whether this movement will continue and ultimately result in some feasible and tangible international organization, or whether, on the contrary, the causes of this movement are temporary and, however great their influence for the time being, whether they will not result in the creation of a permanent general form of international organization, it is beyond all doubt that by this movement the relations of the nations will be more and more affected.

"Each international association brings nations closer together, discovers their qualities, creates personal friendship among their representatives and increases their mutual esteem. Every international gathering certainly drives several nails into the coffin of war.

"The International Association of Congresses of Navigation has the right to boast of being one of the most important in this respect. This Association has practically existed since 1885, when the first Congress of Navigation was held in Brussels, and it became a permanent institution in 1898.

"Congresses of Navigation have since been held in Belgium,

Austria, England, France, Holland, Germany, Italy and Russia. The Association has about 2,000 permanent members. It is encouraged by forty-seven countries, the yearly income being more than 100,000 francs. The only cloud on the sky of our happiness was that we could not, until lately, have a meeting in the United States.

"Just when our wishes were about to be fulfilled, and the work of the organization of an International Congress in the United States was near its completion, one of the most horrible disasters occurred on the Atlantic through a collision of the Titanic with a monster iceberg. The Permanent International Association of Congresses of Navigation is anxious to assure all the nations of the great sorrow which its members experienced at the terrible loss of life among the representatives of many countries, and above all among the American citizens.

"Misfortunes of this kind can but strengthen more and more the ties of friendship and brotherhood of different nations and induce them to combine their forces in the struggle with nature for the security of navigation. Full of profound grief and affliction and of deep sympathy with the relatives of all those who perished in the disaster of the Titanic, the members of our Association are ready to do their best in the research of ways and means capable to minimize the dangers of navigation, if not to render all sea disasters impossible.

"Already in 1908, at the suggestion of the Imperial Russian Government, the XIth International Congress of Navigation admitted in its programme the question of the security of navigation, which reappears also in the programme of the XIIth Congress, thus giving to the members of this Congress an opportunity to exchange their views on this important matter. When discussing it, they must bear in mind that, as a consequence of a resolution passed by the XIth Congress, a special International Maritime Conference on the Security of Navigation has been held in March of this year in St. Petersburg. This Conference has studied thoroughly many points of great value, and resolved unanimously that all questions concerning the security of navigation as relating to ships, rules of navigation, tracks, hydrography, salvage, etc., are to be examined also by the International

Conventions. As you know, the Imperial Government of Germany has also just taken the initiative of a special conference on the safety on sea.

"I sincerely hope that much good will result from the realization of all these suggestions.

"Returning now to the reasons which induced our Association to wish that an International Congress of Navigation should be held in the United States, I must say that this country attracted us in the highest degree, because of her magnificent rivers and lakes, of her beautiful maritime harbors and channels, and above all, because of the enterprising spirit of the American people, of their skill in solving great problems of engineering and of the individuality of their work. In no country has the struggle between navigation and railroads been so great as in the United States. In no country have better technical forces, army officers and civilians, whether in the Government service or in that of the corporations, been employed for the extension and improvement of waterways. In no country, through such a combined action, have greater results been attained than those which the United States have to show on the Ambrose Channel, so marvelous in its greatness and simplicity under such difficult conditions; on the Mississippi, with the improvement of its bars and passes; on the New York State Barge Canal, built for barges similar in size to sea-going vessels; on the Chicago Drainage Canal, where the navigation and sanitary purposes are so happily combined; on the Delaware River; on the New Atlantic deeper waterways, in which our colleague, J. Hampton Moore, has done so effective work; on the Great Lakes; on the Panama Canal; . .

"No other great work now being carried on throughout the world is of such far-reaching and lasting importance as the Panama Canal. Never before has a work of this kind on so great a scale been attempted. Never has any work of the kind, of anything approaching the size, been done with such efficiency, with such serious devotion to the well-being of the innumerable workmen, and with a purpose so lofty and so practical. No two men in the service of any government represent a higher, more disinterested, and more efficient type than the two men at the head of this work—Colonel Goethals, the man who is actually

doing the digging , and Dr. Gorgas, who has turned one of the festering pest-holes of the world into what is almost a health resort.

"To have an idea of the importance and difficulty of what is being done now on the Isthmus, it is sufficient to compare the natural excavation of the cañon of Niagara to that of the artificial cut of Culebra. Both excavations are similar in size, but nature required not less than 35,000 years to make the Niagara cut, and the Americans will make the Culebra cut in six years.

"Several other nations have embarked upon the problem of the Panama Canal since the first hardy adventurers, pushing westward from their native shores, landed on the American coast; and these nations contributed in many ways to the final success of the Americans, thus rendering the Panama Canal an emblem of the application of two great principles :

" 'Navigare necesse' (it is necessary to navigate) and 'viribus unitis' (by combined efforts).

"These principles being the basis of the Permanent International Association of Congress of Navigation, our meeting in the United States on the eve of the opening of the Panama Canal receives an exceptional significance, and is full of promise. The success of this meeting is assured. We expect it with full confidence and with a sentiment of deep gratitude to the Government of the United States, to the City Government of Philadelphia and Honorable Rudolph Blankenburg, Mayor, to the Government of the State of Pennsylvania and Honorable John K. Tener, Governor, to the Organizing Commissions of the XIIth International Congress of Navigation with their Presidents—Generals Raymond and Bixby, Honorable J. Hampton Moore, General Secretary, Lieut. Col. Sanford, Wm. T. Tilden, Vice-President, George F. Sproule, Secretary-Treasurer, J. S. W. Holton, Chairman of the Executive Committee, E. T. Stotesbury, Chairman Finance Committee, and many other distinguished officers whom I cannot mention here—so numerous are those who contributed to the realization of this Congress—and to the American press, which in such a perfect and true way explained to the public at large the significance and importance of the International Congresses of Navigation.

"Let me conclude by addressing on behalf of the Permanent International Association of Congresses of Navigation a heartfelt greeting to the great country which gives its hospitality to the XIIth International Congress of Navigation, and by paying our highest respects to His Excellency, William H. Taft, President of the United States, who has shown such an interest in our work as Chief Patron and Honorary President of the Organizing Commission and who has extended his kindness so far as to open this Congress in person.

After this last speech, Mr. Hampton Moore announced the adjournment of the opening session of the Congress and turned over his powers to Brigadier General W. H. Bixby, Chief of Engineers, United States Army, President General of the Congress, to carry on its further work.

The meeting adjourned at 12.30 p. m. The foreign delegates and the important persons at the meeting went to pay their respects to the President of the Republic who had a kindly word to say to each one. After the reception was over, the President withdrew in the midst of enthusiastic applause.

FIRST SECTION

(Inland Navigation)

OFFICERS OF THE SECTION

Presidents :

Colonel John BOGART, Consulting Engineer, New York.

Mr. Alfred NOBLE, Consulting Civil Engineer, New York.

Vice-Presidents :

GERMANY

Privy Administrative Adviser O. FLAMM, Professor in the Royal Technical High School of Berlin.

AUSTRO-HUNGARY

AUSTRIA

Court Adviser Dr. H. MATHEUSCHE, Director of the Imperial and Royal Warehouses at Trieste.

HUNGARY

Technical Councillor C. POSA, Ministry of Agriculture, Budapest.

BELGIUM

Inspector General J. F. VANDERLINDEN of the Ponts et Chaussées,
Administrative Inspector of the University of Ghent.

UNITED STATES

Major H. E. DEAKYNE, Corps of Engineers, U. S. Army.

FRANCE

Director General DABAT, Waters and Forests, Ministry of Agriculture, Paris.

Inspector General G. BOUVAIST, Ponts et Chaussées, Paris.

ITALY

Senior Inspector E. SANJUST DI TEULADA, Corps of Civil Engineering, Deputy in the Parliament, Rome.

NETHERLANDS

Chief Engineer H. WORTMAN, of the Waterstaat, Haarlem.

RUSSIA

Mr. E. DE HOERSCHELMANN, Member of the Higher Technical Council, Saint-Petersburg.

Professor F. MERCZYNG, Institute of the Engineers of Lines of Communication, Member of the Higher Technical Council, Saint-Petersburg.

SWEDEN

Lieutenant Colonel O. Z. EKDAHL, Royal Corps of Bridges and Roads, Chief of Division of the Royal Administration of Bridges and Roads, Stockholm.

Secretaries :

GERMANY

Privy Court Adviser H. ENGELS, Professor, Dresden.

BELGIUM

Engineer GLAUDOT, Ponts et Chaussées, Brussels.

FRANCE

Engineer LE TROQUER, Ponts et Chaussées, Paris.

HUNGARY

Chief Engineer N. DE SZABO, Budapest.

ITALY

Chief Engineer C. VALENTINI, Corps of Civil Engineering, Bologna.

RUSSIA

Engineer TSIONGLINSKI, Lines of Communication, Assistant to the Director of the hydrotechnic Laboratory, Saint-Petersbourg,

Court Councillor CHOVGENOFF, Engineer of Lines of Communication, attached to the Ministry of Agriculture, Saint-Petersburg.

FIRST SECTION

(Inland Navigation)

FIRST SESSION

Thursday Afternoon, May 23, 1912

Mr. BOGART in the chair

The meeting was called to order at 2.15 o'clock.

After having welcomed the members of the Section, the Chairman read the **first question** to be discussed at this session, worded as follows :

Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the cases in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal.

Ten reports on this subject by : Messrs. Sympher (Germany), Lauda and Müller (Austria), Harts and Landreth (United States), Kauffmann (France), de Kvassay (Hungary), Valentini (Italy), Gockinga (Netherlands), and de Timonoff and Kleiber (Russia), were laid before the Congress.

The Chairman requested the General Reporter, Lieutenant Colonel Newcomer, to read his conclusions.

Colonel Newcomer (in English). — Gentlemen, the following are the conclusions which I have laid down at the end of my report:

1. *Under the widely varying requirements of navigation, and the very different physical conditions of slope, discharge, and nature*

of bed, no single method of improving the navigability of a river has superior advantages in all cases, but each may in turn be found most satisfactory under special conditions.

2. *The choice of a method of improvement depends not only on the capacity of the stream for improvement by the different methods, but also on the volume of commerce to be benefited and the resulting cost of transportation, including interest on the cost of improvement, maintenance charges, and the cost of carriage.*

3. *The slope, discharge, and nature of bed and banks are the main factors determining the limits and the cost of improvement by the ordinary methods of regulation, dredging and canalization, and the prospective tonnage is the main factor determining the justifiable expenditure.*

4. *Regulation and dredging, either singly or in combination, are apt to be more uncertain and limited in their results than canalization, but they are usually preferable when the needs of navigation can be satisfied by these means. Otherwise it is generally advisable to employ canalization, using fixed or movable dams, depending upon the limitations imposed by flood conditions, and the requirements of navigation.*

5. *Lateral canals are usually less desirable than canalization but may be required under some conditions.*

6. *Reservoir control of stream flow, sufficient to meet the needs of navigation, is usually impracticable within reasonable limits of cost, but in rare cases it may be used to advantage to supplement other methods of improvement.*

7. *It is desirable that the following steps be taken with a view to perfecting the methods employed for improving the navigability of rivers :*

a) *That scientifically organized special studies be undertaken by sundry nations, on rivers with different regimens, in order to observe the degree of navigability which it is possible to attain by the application of various methods of improvement and to determine the factors which govern the cost of the corresponding works.*

b) *That hydrotechnic laboratories intended for the study, on small scale models, of the life of rivers become of more and more extended use, and that they be supplied with the means necessary to experiment with the various processes for improving the na-*

navigability of rivers and, in so far as possible, in connection with the studies and works carried out on the rivers themselves.

c) That the resolution of the VIth Congress of Inland Navigation, voted at The Hague in 1894, be carried into effect, this resolution calling for taking up, in connection with rivers having but one current, the study of a short, dear formulary, which shall be sufficiently complete and include the information necessary to define the characteristics of every river studied, from the double point of view of its regimen and its navigation.

d) That the question of the improvement of the navigability of rivers having but one current, completed by those of the laboratory experiments and of the formulary, be kept on the order of business of the next Congress of Navigation.

Mr. Claudot, Secretary for Belgium, read the same conclusions in French.

Mr. Engels, Secretary for Germany, expressed the opinion that it was not necessary to read the conclusions in German, as they had been read in French and in English.

The German members, present at the meeting, shared this opinion,

The Chairman. — Mr. Smrcek has the floor.

M. Smrcek (in German) :

Gentlemen,

Will you allow me first of all, as a member of the Chamber of Deputies of Austria and in the name of a large number of my colleagues, to salute the XIIth International Congress of Navigation and to offer it all our feelings of sympathy.

In Austria, we are engaged in a severe struggle to carry out the law relating to navigable highways passed in 1901, and we hope, with your moral support, to win in the end. As the result of our efforts and in spite of the powerful contrary currents against which we must fight, the actual construction of navigable highways has been begun in our country not only on the Moldau and the Elbe

in Bohemia and on the Vistula at Cracow, but also on the Galician section of the canal from the Danube to the Oder and the Vistula.

As a member and a delegate also from the *Zentralverein für die Fluss- und Kanalschiffahrt* of Austria and from the *Moravský ricni a průplavné spolek*, I have been directed to express all the sympathy with the labors and resolutions of the Congress which is felt by these two Associations which are so in favor of inland navigation.

The peoples of Austria are very deeply interested in navigable highways and the regulation of streams, especially at the present time when there is so much discussion going on over the *law relating to navigable highways* recently introduced by our Government.

We will not and cannot close our eyes to the brilliant economic flight of our neighbor, the German Empire, which recorded in 1905, for the Rhine, the Elbe and the Weser, a traffic eight times as great as that for 1875, and a net efficiency which reached on the inland navigable highways of the country, in 1905, the respectable figure of 15,000,000,000 kilometric tonnes (= 10,274,000,000 mile tons) (1), thus obtaining in the mere cost of transportation, as compared with transportation by rail, an annual saving of more than a hundred million marks for the German tax payers, and that too without any injury for the income of the railways which are operated by the State.

We consider that it is an *indispensable necessity for the economic prosperity of Austria* that heavy low-priced transportation from one part of the country to another and toward Central Europe, which the railways cannot meet, should be carried by water and that Austria's ability to compete for the markets of the world should be assured while there is yet time. In order to accomplish this, *the Danube, the Elbe, the Oder, the Vistula and the Dniester must be connected together, so soon as possible, by canals of the first order, as provided for in the law of 1901.*

The answer to the first question, relating to the improvement of the navigability of streams, is of the highest importance for Austria.

It is known that very satisfactory results have been obtained, by

(1) In this translation, the spelling *tonne* means always the metric tonne which equals 2204.6 lbs avoirdupois, while *ton* means the American ton of 2000 lbs.

regulating works and by dredging, on the Moldau and the Elbe in Bohemia, and that, after attempts at regulation which cost much and produced many disappointments, very good conditions of navigability were also reached on the Danube.

Nor is it unknown that, by reason of an insufficient low water discharge, the Moldau had to be canalized below Prague, and that, for this same reason, works are now going on for the canalization of the Elbe downstream from Melnick to Aussig, and upstream as far as Pardubitz and Iaromer.

Experience with these works has enabled us to collect a mass of data and these force on us the duty of taking a stand, from the Austrian point of view, on the question relating to the improvement of the navigability of streams which is on our order of business.

With Mr. Sympher, I am a *thorough partisan of navigation on open streams*, on condition that the low water supply necessary for this can be obtained from supplementary water supplies without too great cost. It is only when this condition cannot be fulfilled or when it cannot be had in a comparatively short time, that there is any reason for considering the canalization of a stream, suitably combined with the construction of lateral canals.

Free navigation can be improved on streams of variable depth :

1° By the assistance of mechanical dredging at points where the depth of the navigable channel is small ;

2° By the construction of various permanent works, such as longitudinal dykes, spur dykes, guide dykes, bottom sills and bank defences which ought to prevent deposits of sediment in the navigable channel ;

3° By the combined action of permanent works and dredging.

It is under a sense of profound conviction that I subscribe to Mr. de Timonoff's theory, that *good results can be obtained by dredging* only on large streams having a light slope and carrying but little matter in suspension and that the river cannot be spoiled as easily by dredging as by permanent works, as happens most inopportunately from time to time, without the matter becoming known in the technical world. Unfortunately, the courage is generally lacking to confess and set forth that such or such work for regulation has proved a failure or has not been wholly successful, and yet, by doing this, a service would be rendered to science and,

following the example thus set, it would be avoided elsewhere. How often it has happened that, under the attraction of novelty, a system, over which much noise has been made but which, nevertheless, was false in principle, has been applied, at great cost, simultaneously on several rivers—only to make, if the truth were told, the conditions of navigation worse than before, rather than to improve them and reach the end proposed for the regulating works as laid down always by him who proposes a work of this sort.

In order to maintain continuously, and to the advantage of navigation, the favorable results obtained by dredging, it is well, doubtless, to contribute thereto by means of works for shore protection or of permanent regulating works, suited to the character of the river and laid down along the concave banks, so that sedimentary deposits may not change the position of the channel which has been dredged to the proper form and so that it may not be necessary to resort to new dredging several times a year; after every flood, for example.

Here, as always in like cases, economic considerations will indicate the solution to be adopted, and it is these considerations which will show whether, in order to obtain the same result, it will cost less to dredge repeatedly at the same point than it will to dredge there once and then build and keep up permanent works on the concave banks to hold the channel in place, or whether the reverse will be the case.

If navigation is to be subserved under the desired conditions, *the regulation of a river by means of permanent works* demands a very special knowledge of the character of the stream as well as solid theoretical knowledge and, above all, long experience and the innate appreciation of the cross section required by the river to meet the conditions of its longitudinal slope, of its often ceaselessly changing discharge, of the velocity of its flow and the amounts of ice and boulders it carries.

All my esteemed colleagues who have prepared projects for regulating rivers for a series of years, who have carried out the works and who have observed and noted down impartially the results obtained, can tell you, as I do, how difficult if not directly impossible it is to determine theoretically the plan and the respective heights of the permanent regulating works *i. e.* by means of

mere calculation based on given formulæ, and how we have, in most cases, to go feeling our way along before becoming aware, ere the work is half done, of that which suits or does not suit this or that river.

This being so, I am led to *call the regulating works on a stream as rather an "art"* and to recommend that, for administrative reasons, care should be taken to avoid making too frequent changes among the Engineers attached to the works for regulating a river, in view of the fact that *the experience acquired along a stream can rarely if ever be transmitted in full to eventual successors*, after the fashion of what takes place when documents are transmitted, and many millions of public funds are often wasted, without any economic utility, before it is discovered or granted that the works are a failure, that is : before the responsible Engineer has acquired the necessary experience and certainty.

In so far as *the arrangement of the channel of the river in plan* and even the regulating works are concerned, there will no longer be found in these days a single intelligent engineer who, having overcome the first difficulties of his school days, of the line (*tracé*) on the ground, would adopt the unnatural elbow fashion, formed by arcs of circles alternating with tangents. He will incline rather to the natural and elastic winding of the sections considered on a river as determined by the researches and observations of Fargues, Girardon and many other hydraulic engineers who have been successful in regulating rivers.

Recourse will no longer be had to *spurs alone*, to the exclusion of any other work, but rather to a *combination of spur dykes with longitudinal dykes on the concave parts*. A better flow and the necessary impulse are thus insured for the water especially when the ice is breaking up; the heads of the spurs will be no more attacked, the depths of the bed of the stream will be more regular and navigation will become less dangerous.

On the other hand, longitudinal dykes on both sides of the channel of a stream will rarely be built at once, because it is very difficult, if not impossible, to say at once just how far apart these works should be placed. Care must be taken, in any event, not to place the roots of the works on the right and left banks of the river in the same cross-section, but to make them alternate from bank to bank according to the direction of the current.

The part of the guiding dyke situated in the concave portion of the bend will be made higher than the rest, so as to direct the sediment and the higher waters more securely and in order that navigation shall not be interrupted too soon by floods.

The space between this regulating work and the shore will be divided, by as many cross walls as possible, into short sections so that, in time of high water and in case of the deviation of the centre line of the current, no new bed may be formed by scour outside of the limits of the navigable channel.

The cross section of the regulated river and the transverse works should rise gradually toward the banks, the slope being steeper in the concave parts and lighter in the convex.

The deposit of sediment as well as the interests of fish-breeding are favored by openings appropriately located in the longitudinal dykes or by short breaks to be provided for in their works.

The question of knowing whether longitudinal dykes should be connected to the bank at the upstream end or at the downstream end has not yet been settled. It would be well to have this matter tested on a large scale and to have a report on the results obtained submitted to the Congress. A certain length of the Moldau above Melnick has been regulated, as an experiment, by means of longitudinal dykes anchored to the bank at their downstream ends. The result obtained are satisfactory, so far as the deposit of sediment is concerned.

It is proposed, at points where the channel is too narrow, to make rather short breaks in the continuity of the regulating works on one of the banks; this will be done at points where it is assumed that the desired depths of water will be maintained so that boats can turn, and so that damaged boats can gain, eventually, shallow parts of the stream outside of the navigable channel.

In so far as the *regulation of low water* by means of ground sills is concerned, favorable results have been observed already on some streams having a rather strong current. The Rhone, very successfully regulated by Girardon in the South of France, may be mentioned as an example. It would be desirable to have laid before the Congress detailed reports on the subject of satisfactory results obtained with the assistance of this method of regulation and on the subject of the observations to which it has given rise

on rivers where the ice runs heavily and where navigation is carried on by means of chains, while at the same time there is taken into account the action of trees and other quite heavy bodies, which are carried away finally by the water, on the permanent works set below the plane of low water.

I agree with the opinion expressed by most of the Reporters, who find that—in order to be able deduce exact conclusions on the subject of the expediency of any method of regulation—it is necessary to regulate *as an experiment* a very long section of the river, say 10 to 50 kilometres long, according to the importance of the stream, and not to be satisfied with causing an obstacle to navigation to disappear, perhaps, over a small stretch while making, in doing this, the depths above and perhaps even below worse than they were before.

I shall add further, that it is indispensable *to make a detailed survey of this section before the regulating works are begun, while they are going on and frequently after their completion*, especially after the passage of each flood. All the data thus gathered should be coordinated scientifically and laid before the Congress.

This is the only way in which an objective and wholly unprejudiced examination can be made of the intrinsic value of a method of regulation, for it may happen that the weakness of human nature may lead some Engineers to prefer works of improvement of a certain kind, especially those of which the results have not been too bad, and to distrust and even to be dissatisfied with other methods with which they are not familiar.

Consequently, I stand by Mr. de Timonoff's proposition which calls for undertaking special researches, based on scientific principles, in all countries and on streams of widely different characters, with a view to determining the degree of navigability of these streams; and also for building *institutions for hydrotechnical tests* intended to study, on small scale models, the observations of the regimens of streams, and for furnishing to these institutions the means necessary to carry out, in accordance with various methods, the trials of the improvement of the navigability of rivers in proportion, in so far as may be, to the researches and the works made on the streams themselves.

This process would have a happy influence not only on the

education of future Engineers but also on that of Engineers now in charge of regulating works on rivers, and in this way *not alone science* would be served, but *also the finances of many countries* which are nearly always opposed to the costs involved in regulating works.

For this reason also, I second the proposition of Mr. de Timonoff which demands that the question of the improvement of the conditions of navigability of rivers with an open current be *placed on the order of business of the next Congress of navigation and completed by the questions relating to experiments in the laboratory.*

Passing now to the question of improving the conditions of navigability of rivers by means of *canalization and the construction of lateral canals*, I agree with Major Harts, who considers that the utility of canalizing a stream begins at the point where the utility of improving the open river ends.

When the low water discharge of a river falls off to such an extent during the period of navigation that no method of regulating can furnish a navigable channel of the depth and breadth desired, together with a current of moderate velocity, and if on the other hand the supply of additional water cannot be counted on, either for economic reasons or within a reasonable time, canalization, combined rationally with the construction of lateral canals, forms the only and the surest means to make a river navigable even in times of low water.

This was the main reason why *canalization was adopted in Bohemia on the Moldau and on the middle course of the Elbe* above Melnick. It was only with great regret that it was decided also to canalize the great Elbe on the *stretch from Melnick to Aussig*, after it had been settled, on the basis of the studies of Hofrat Rytir and Bauräte Machulka and Crammer, that there was no system of regulation which would obtain the necessary depth and breadth in the navigable channel. And this was proven, unhappily, to all who might have been in doubt, by the sad years of 1904 and 1911, which affected the navigation of the Elbe, and during the course of which the navigation of this stream came completely to a stop for long months as the result of low water not only in Austria but also in Saxony and Prussia.

Mr. Bohuslav Müller, Chief Engineer at Prague, has shown

conclusively, on the other hand, with the help of abundant numerical data contained in his report to the Congress that it was impossible, within the time desired, to count on a sufficient volume of additional water to come from Bohemia, and that the canalization works under construction on the section of the Elbe between Melnick and Aussig had to be put in and that they were absolutely necessary.

Again, the influence which will be exercised by a regulation of the upper part of the middle Elbe over its lower portion, was examined thoroughly by Mr. E. Lauda, Engineer and chief of section at Vienna, in a report sent in by him to the Congress.

A canalization of a river which has been properly carried out has this advantage which cannot be sufficiently highly prized, that navigation can be begun immediately that the works are finished and that it can be kept up from one level to the next both up and down stream, and this advantage, especially for times of low water, is recognized even by the most ardent partisans of free navigation. The excess water can also be used for supplying power and be turned to account by industry and for the needs of agriculture.

In connection with the canalization to be undertaken on a river which is already navigable at mean water, *there is one condition* which I should like, however, *to see laid down and rigorously enforced, namely: that existing navigation should be injured in no way when the dams are down*, and that neither the conditions of the height of the water above the permanent sill of the dam in the pass reserved for boats, nor those of the velocity of the water in the profile of the dams, when these latter are laid down, shall be made worse than they are.

Beginners, who have not yet acquired the necessary experience or the touch of the specialist, commit ordinarily, through the use of hydraulic formulæ which may be applicable on a small scale and on models with a fixed bottom, the great blunder, which is so unfortunate for navigation, of placing the permanent sill of the dams too high. These beginners forget, as a rule, that as the result of the greatly modified cross section above and below the dams, great changes and deteriorations of the bed of the river begin to take place with the first rise; that a scour is developed just

below the still of the dams and that the bottom is raised still further down. The consequence of this is that the level of the surface of the stream falls more and more as the stage of water becomes lower, and that the depth of water on the still of the dam, as given by calculation, is reduced 50,100 and even more per-cent, and *all circulation of navigation is completely paralyzed when the dams are down*. It should not be forgotten that when frost has appeared suddenly most of the dams should be laid down, without its being desirable or possible to interrupt navigation completely on this account, in view of the fact, for example, that circulating boats ought still to reach their destination or make a harbor of refuge, so as not to be obliged to spend the winter scattered here and there along the stream.

Sight should not be lost of this fact that, in certain cases, *the canalization of a river of small importance, in the interests of navigation, should be regarded as a temporary work of quite long life*, the temporary character of which should end from the moment when, by the construction of a sufficient number of reservoir dams, there shall have been stored up such a large water supply that navigation can be carried on freely during low water with the dams in the river lying down.

A river on which canalization works are under construction should also be regulated. Its shores should be protected against the action of waves. Dredging should be done to remove sediment which, by reason of the pools, cannot be carried away. Fishways should also be built for the needs of pisciculture and for the necessities of fishing. Unfortunately, fish generally keep away from the fishways no matter how carefully these may have been built. This is a well known fact.

The duration of the period of navigation is reduced by the amounts of time necessary to raise and lower the dams. It is well, moreover, to bear in mind that dammed in and quiet water freezes over more rapidly than does the running water of an open river.

A large and rather dangerous wave is caused when the dams have to be laid down suddenly, and complications in the service of the prediction of rises may arise from this action.

On open rivers where a large rafting traffic is carried on, cana-

lization renders necessary the towing of trains of rafts which gives rise to heavy costs, or else, when it is a question of long stretches on canalized rivers, this mode of transportation, used for wood on shallow streams, must be given up and the materials be loaded on boats, or again, they must be assembled in heavy rafts of great draught and, after reaching the non-canalized and open part of the stream, the bonds have to be cast off in order to reform the simple rafts, all of which involves losses of time and additional expense.

The efficiency of the canalized river can, however, always be adapted, by means of ordinary chambered locks or locks for trains of boats which have been rationally constructed, to the necessities of the traffic no matter what its amount may be.

A certain care must be exercised in selecting the best system of dam for a river which is to be slackwatered. It is so easily and so frequently forgotten that the parts of the structure placed beneath the water are hard to reach, that their renewal and repairs call for a great deal of time and are expensive, and that metal work is easily attacked by rust, especially under water and, above all, just below important places where many factories are scattered about. Then too, it is often forgotten that silt interferes with the handling of the dams, to say nothing of the derangements caused by ice, floating wood, etc.

It should not be forgotten, in estimating expenditures, that the first cost and the cost of maintenance of a slackwatered river, when compared with those of an open stream, should be increased by the price of works for the pool itself (locks and dams) and by the wages of the permanent hands, whereas, on the other hand, the cost of regulating works remains the same on the running parts of the stream, be it canalized or open.

Several reporters (Messrs. W. Harts, R. H. Gockinga, C. Valentini) and the esteemed General Reporter, Col. Henry C. Newcomer, also, but with reserve, have spoken quite unfavorably on the subject of the *use of lateral canals for making rivers navigable*.

In any event, some misunderstanding must exist here, perhaps in this sense: that reference was made to a continuous navigable canal built right along by the side of the river, the latter merely furnishing the water supply of the canal.

I can, from my own experience, recommend most highly to my honorable colleagues, *the widest use of lateral canals, suitably combined with the slackwater system of a river and adapted to the conditions of the ground, seeing that they allow the rapids of water courses to be circumscribed and the number of the levels to be reduced by half and even more; and that, not only are the interests of navigation better served in this way, but the costs of the construction and maintenance of the navigable highway are also greatly reduced.*

Starting with this idea, I prepared in 1893, for the firms Launa-Vering, a *general project of the canal from the Danube to the Moldau and the Elbe*, in which I provided *exclusively for a combination which involved the slackwatering of the river by means of movable dams and of lateral canals alongside of these and closed by locks*, so as to make the Moldau navigable from Budweis beyond Prague to Melnick, and the Elbe from Melnick to Aussig. It was indispensable on the very sinuous stretches of the Upper Moldau, shut in by masses of rock, to resort to short tunnels, in order to cross certain slopes, and pass over the river on canal aqueducts. Nevertheless, it was on the basis of this project that the conviction was acquired that the Upper Moldau could also be made navigable to the point of allowing the circulation of boats of 600 tons, and that the number of locks could be reduced to a minimum which could be accepted. The ideas of my general project were also taken up by the Austrian Government to serve as a guide for working out a detailed project under the direction of the Board which was appointed for the canalization of the Moldau and the Elbe in Bohemia, and the works which were its consequence, and which were carried out by the eminent Director, I. and R. Chief Engineer W. Rubin, are now on the point of reaching a successful end.

As this example of the rational use of navigable canals provided with locks is not exceptional, I should like to propose to the Congress to be so kind as to prepare the final conclusions, of the question now before us, along the lines which I have just set forth.

In the matter of the process which consists in making rivers navigable by means of an increased supply of water, Mr Sympher seems to be quite alone in his views. Most of his fellow reporters

have spoken of the advantage of an additional water supply as being of small importance in practice. The General Reporter also, in his final conclusions, beats about the clear and exact reply to be made to this question in such a way that it may be said that no conclusion is given in the matter to the technical world.

It is my conviction that here too, Gentlemen, we shall succeed in reaching a unanimous conclusion which is satisfactory to every one, because the partisans of the method of regulating by additional water supply or, what amounts to the same thing, the defenders of the regulation of streams by regulating the discharge of storage reservoirs, would not desire either, I suppose, to resort to additional water supplies to make the lower parts of the Mississippi, the Danube, the Rhine, etc., more navigable. But the navigation of the upper part of the Mississippi and the Ohio, the Oder, the Moldau and the Elbe, the Weser—as Mr. Sympher has so well proved—and many other rivers, could, evidently, be improved with success by the use of an additional water supply. Even the conditions of flow of the waters of the Nile have been regulated by the construction of the dam at Assouan. In Moravia also, the conditions of the flow of the March will be regulated, but on a smaller scale.

This being the case, I accept with entire conviction the proposition of Mr. Sympher, stated in these terms: "In working out the details of projects tending to make a river navigable, it is well, in cases which seem to be appropriate for that purpose, to examine whether it be possible and, if necessary, to what extent, to resort to regulation and to an additional water supply from storage reservoirs, in preference to canalizing a stream".

I also recommend the construction of reservoirs in places where, as in Bohemia, for example, the rivers have been canalized already, for I have always the firm hope that in a certain future, although still quite far away, navigation will be able to go on below Melnick without being bothered by dams for forming the pools, and the more so because the lower part of the Elbe in Saxony and in Prussia will reap its advantage also from the additional water supply, and because, in this way, navigation will no longer have to come to a stand-still in these parts even during years of drought.

It would be most unjust, however, to wish to carry the cost of furnishing the additional water supplies exclusively to the account of navigation.

The storage reservoirs, of which the consequence is a diminution of the damages caused by floods, an increase in the height of low water and to allow the utilization of hydraulic power, render, as a matter of fact, just as important a service not only to the interests of industry and agriculture, but also to those of all the riparian owners lying along the lower part of the river, to the industrial and power plants situated by the stream, and to settlements, by carrying off the waste water, to say nothing of the needs of pisciculture and of general sanitary interests.

I think that the preceding considerations should be taken into account in drawing up the conclusion of the Congress. Let us say here boldly that the navigability of rivers has been greatly injured by many measures adopted in the general interest and to the advantage of agriculture, such as emptying ponds, drying up vast marshes, obstacles to the overflow of certain tributaries, cutting down woods, ill conceived expansion of settlements along the river, etc., and the most marked result has been that the low water surface has fallen greatly. Hence the duty is again laid on the people in general to do over what has been undone, that is to say : what has been useful to some has worked harm to others. In the case before us, it was the navigability of rivers which was damaged, and this situation should be remedied at the cost of the tax payers in general by resorting to additional water supplies coming from storage reservoirs.

Moravia, which is my native country, in particular, is now proposing to apply a remedy along these lines, by *constructing a system of supply reservoirs*, to the situation of its agriculture and of its industry and also to that of the whole country and to the conditions of flow of the waters of the March; I desire earnestly to state and to welcome these happy intentions.

Gentlemen,

It is our duty to offer to the Reporters all our thanks for the abundant materials which they have placed before us in reply to the first question. But above all, especial praise should be offered to the difficult work of Colonel Newcomer, the General Reporter, who has done his best to draw up his final conclusions in accordance with the reports presented to the Congress. But, in order to lay

down these conclusions clearly and exactly, I propose that *a sub-Committee of a few members be appointed which, in accord with the General Reporter, shall proceed to give the final wording of the resolutions to be submitted at the final general meeting of the Congress.*

The Chairman. — Mr. de Timonoff has the floor.

Mr. de Timonoff (in French). — The question of the improvement of rivers, as it has been laid before the XIIth International Congress of Navigation, involves the determination of cases in which resort should be had to works of one kind rather than to works of another kind, in order to improve the navigability of any given river to an extent fixed in advance.

Hence the Congress has, in one way or another, to answer the question thus stated. If it cannot give a positive answer, it must say so clearly so as to leave no doubt.

The analysis of the reports on the question of the improvement of rivers, presented by their authors to the XIIth Congress, seems to have led the General Reporter to notice that a positive answer to the question laid before the Congress cannot yet be given. The General Reporter, however, has not said this explicitly in his proposed conclusions. On the contrary, he proposes to adopt several conclusions which are of a sort to make people think that the Congress has found the solution called for.

For example,, the General Reporter says, in paragraph 3: "The slope, discharge, and nature of bed and banks are the main factors determining the limits and the cost of improvements by the ordinary methods of regulation..."

Without examining all the details of this form of expression, it is enough to say that it can lead to admitting, for example that the discharge of a river fixes the limits of the cost of the improvement by regulation with permanent works. Now, this is not exact. Rivers having the same discharge may have very different regimens and especially very different depths, whence there follows a very great difference in the cost of regulation. There is no doubt that the General Reporter himself shares this opinion, but it is true, none the less, that his form of expression is such as to give rise to misun-

derstandings. In paragraph 4, the General Reporter states that regulation and dredging applied, either separately or together, may lead to results which are less certain and more limited than does canalization, but it is well to adopt them when they are sufficient to satisfy the needs of navigation. On the contrary, according to the General Reporter, the use of canalization by means of permanent or fixed dams may be recommended ordinarily, by taking into account the restrictions imposed by the flood regimen and also the demands of navigation.

These points cannot fail to raise many objections. It must be remarked, first of all, that if regulation and dredging may lead to results which are less certain and more limited in some cases, there are other cases in which the contrary is found. Rivers with a very light slope, flowing between low banks, do not lend themselves at all easily to canalization. Here the results of dredging are very sure and their limit has not yet been reached, as is proved, among others, by the examples quoted by the General Reporter himself, and by many others which are familiar to every one.

On the other hand, the General Reporter believes that he can recommend the use of canalization for those cases in which regulation and dredging applied, either separately or together, do not suffice to satisfy the needs of navigation. Now, the general practice of international Congresses is to refrain from recommending anything whatever. In the special case before us, a recommendation like that which has just been mentioned should be particularly avoided, because it ought to be accompanied by a great number of restrictions of which the General Reporter does not speak. First of all, an agreement should have been made as to what is to be understood by "the demands of navigation" (*les exigences de la navigation*) or by "the needs of navigation", (*les besoins de la navigation*), which, according to the General Reporter, determine the necessity for canalization. Without some preliminary definition, the sense of these words remains obscure and is liable to cause serious disappointments. In fact, it might be thought that the Congress recommends that the navigable highway should always be adapted to the needs of the boating interests which exist already, whereas in many cases a mixed solution is sought which not only improves the highway but which transforms the boat itself if necessary.

The same character of insufficient reply which may lead to misunderstandings, and which is less admissible than no reply at all to the fundamental question laid before the Congress, is found in the 5th and 6th conclusions which treat of lateral canals and storage reservoirs.

Without dwelling longer on the draft of the conclusions prepared by the General Reporter, it should be noted that this draft does not reach the object at which the author aims, which is: to bring out, at any cost, from the mass of the articles on the first question laid before the Congress, a general reply to the question discussed in these articles.

The draft of the conclusions does not and cannot reach this object, and for a very simple reason: the articles mentioned do not contain all the elements necessary to formulate this reply, nor can they contain them, because the classification of rivers from the double standpoint of their regimen and their navigation is still to be prepared, in spite of its having been called for already as far back as 1894 by the VIth Congress of Navigation. Without having first prepared a formulary containing the information necessary for defining the characteristics of each river, as desired by the Congress mentioned, immense difficulties will arise every time that the question comes up of comparing the results obtained on different rivers by various methods of improving their navigability.

Under these circumstances, it seems that the XIIth Congress of Navigation should admit openly that it does not yet possess any fixed rules for determining *a priori* the method which should be preferred in a given case of improving the navigability of a river. A conclusion which expresses this idea squarely should replace conclusions 3, 4, 5 and 6 of the General Reporter.

As to conclusions 1 and 2 of the General Reporter, they express in the main the same ideas as those contained in the first conclusion of the report of Messrs. de Timonoff and Kleiber, save one omission, involuntary perhaps, in regard to the co-existence, when works for the improvement of navigability are going on, of other ends sought by these same works, such as agricultural interests, defence against floods, etc. It seems that this omission should be brought back, but, on the other hand, it might be well to bring out more clearly the financial side of the problem, as the General Reporter proposes to do.

In making all these observations, I recognize fully the merit of the work done by the distinguished General Reporter, and I could only wish that this very conscientious labor should lead directly to the result which he has in view, viz : to have the Congress adopt, on the question of the improvement of rivers, conclusions which shall express in the best possible form the sentiment of the great majority, if not of all the members of the XIIth Congress. At the same time, *I believe that I should refrain from criticising individual reports on this same question, as well as from answering any probable criticism of my own report, so as not to obscure, by the examination of details, the general analysis of the question before us.* Besides, it is believed that in the report prepared by myself, with the assistance of Mr. Kleiber, all the elements of a criticism of the method of dredging have been collected with minute care and that the very conclusive results of the use of this system have been shown by the example of the work on the Volga which covers a long period of years.

By reason of the preceding considerations, the draft for the conclusions of the Congress on the first question of the first Section should, in my opinion, take the following form :

1. — **Absence of any general method.** — “ *The navigability of rivers having but one current can be improved, as has been said, many times and oft, at the Congresses of Navigation, by sundry methods, such as regulating the bed by mechanical dredging, regulation of the bed by permanent works, increase of depths by an additional water supply furnished by storage reservoirs, canalization of the bed, combined action of the above processes, construction of a lateral canal.* ”

“ *The use of one of these methods in preference to any other depends, in each special case, on the special circumstances which exist. Among these, the nature of the river and of its navigation, the presence of other objects for works besides navigability (consolidation of the banks in the interest of agriculture or towns, defence against floods, etc.), degree of navigability sought, importance of the anticipated traffic, cost of transportation inclusive of the interest on the capital laid out for the improvement of the line, maintenance and charters, money and time at hand to insure, for the boating industry on the line in question, the conditions of navigability sought, etc., are of the utmost importance.* ”

2. — **Impossibility of laying down so soon fixed rules which will point out, "a priori", the method to be preferred in a given case. —**

" Observing that the various methods used to improve the navigability of rivers have given satisfaction and attained the end in view, for the special circumstances under which they have been used, the Congress finds that it would be premature to try so soon to lay down fixed rules indicating, a priori, the method which should be preferred in a given case; and the more so, since the classification of rivers from the standpoint of their regimen and their navigation has yet to be made."

3. — **Necessity for studies. —** "If there be no general method of improving the navigability of rivers which is applicable in all cases, if the choice to be made among the various methods be always governed by circumstances and remain a question of kind, if, finally, it be not yet possible to lay down fixed rules which shall indicate, a priori, the method to be preferred in any given case, the Congress finds that, on the one side, each process may be better adapted to those rivers having a determined regimen and that, on the other side, the rules in question can only be laid down after long and severe studies carried on with that end in view.

" Consequently, the Congress resolves :

" a) That scientifically organized special studies be begun by various countries, on rivers having different regimens, to determine the degree of navigability which it is possible to reach by the application of different methods of improvement and to determine the factors which regulate the cost of the corresponding works;

" b) That hydrotechnic laboratories, intended for the study on small scale models of the phenomena of the life of rivers, be extended further and further and be provided with the necessary means to test the various processes of improvement of the navigability of rivers, and, in so far as possible, in connection with the studies and works carried on in the rivers themselves;

" c) That effect be given of the resolution of the VIth Congress of inland Navigation, adopted at The Hague in 1894, and asking that there be taken up for rivers having but one current the study

" of a formulary which shall be clear, short and still sufficiently
" complete and which shall contain the information necessary for
" defining the characteristics of each river when studied from the
" double point of view of its regimen and its navigation;

" d) That the question of the improvement of the navigability of
" rivers having but one current, completed by those of the labora-
" tory experiments and of the formulary, be kept on the order of
" business of the next Congress of Navigation."

4. — Necessity for continuity in the application of any method.

— " Whatever be the method of improving the navigability of
" rivers which may be adopted for use in a given case, it should
" be applied continuously and systematically over the whole
" length of the river or over a great part thereof, having the cha-
" racter of a line of communication of a fixed gauge, because the
" improvement of isolated bars cannot, as a rule, increase the
" draught of water for the boats using the line in question, and
" often may cause the formation of new obstacles to navigation."

Finally, I think that I ought to say once more that the question of the improvement of the navigability of rivers, such as it has been laid before the present Congress, demands a general discussion during which, in the interest of the cause, the special features of this or that report should be set aside, and that the forces of the members should be united to find for the above question an answer which shall be worthy of our Association. Consequently, in so far as I am concerned, I shall take the liberty of not replying here to any possible criticism of the personal ideas which I have set forth in my report, but shall second Professor Smrcek's view which would have the search for the conclusions on the question of the improvement of the navigability of rivers left by the Section to a special Committee.

The Chairman. — Mr. Germelmann has the floor.

Mr. Germelmann (in German) :

Gentlemen,

If I rise now, it is only because Mr. Sympher, Reporter of the question from Germany, has been prevented, unfortunately from taking part at our meetings.

I shall begin by thanking the Reporters of the various countries, and especially our General Reporter for the great pains which they have taken and for the great interest which they have shown in the treatment of the question now before us. I am convinced, and most of my fellow countrymen are doubtless of my mind, that the reports laid before the Congress have caused a great step forward to be made in the question of the regulation and canalization of rivers. If I do not agree with the General Reporter on all points, the reason is, doubtless, that the question as stated, places navigation only in the foreground. But, Gentlemen, all those who belong to densely populated countries, where agriculture is very highly developed, will agree with me that it is not possible to regulate or canalize a river in the interest of navigation alone. When problems of kind have to be solved, it is well that agricultural interests should also be taken into account; and in doing this, we shall be led necessarily to make a somewhat different reply to the question of knowing whether, in a given case, resort should be had to regulation or to canalization.

Professor Smrcèk, in speaking for Austria, has already told us that in his country too, the question, of knowing whether canalization ought to be used or lateral canals preferred, had been the object of a thorough examination. This question has been much discussed also in Germany and this result has been reached, that canalization should be used only when regulation works, even with the aid of dredging or by the construction of works on the water way, or with the assistance of both these methods combined, or again, when the construction of storage reservoirs do not succeed in improving the river.

In our opinion, canalization has one weak point; it cannot be put into effect, in the countries to which I alluded a moment ago, without giving rise in most cases to serious disadvantages from the agricultural standpoint. The level of the water surface of the rivers is raised, then there follows a rise in the level of the subterraneous water, which is injurious for agriculture. Frequently it is not possible to remedy the resulting damage except at great cost, and even then the remedy cannot be made complete in many cases. This consideration, in so far as Germany is concerned, prevents our being wholly of the opinion expressed by the General

Reporter in his conclusions, when he says: that regulation by an additional water supply, obtained by storing up water, is not possible without unreasonable expenditures. Gentlemen, in thickly settled countries where agriculture is highly developed, the result will have to be reached, in all cases, of so regulating the flow of the water as no longer to let any of it run off freely at the foot of the slopes, but to store it up in times of plenty at the upper part of the course of the rivers; to act otherwise would be to waste. In countries traversed by large rivers and possessing lakes of some size which form natural collectors, this question is of no great practical importance; but in countries where nature has not been generous in this respect, resort will have to be had to the artificial means of storage basins, so as to protect the riparian owners below from inundation and so as to have at all times the water desired for power stations, for city needs and for irrigation. These basins will also serve frequently to furnish, in dry seasons, an additional water supply for the rivers; they can then be in this way of great value from the point of view of navigation.

The Reporter from Austria has brought out the great interest which the regulation of rivers possesses from the agricultural standpoint, and, if I have understood Professor de Timonoff correctly, he too has expressed the opinion that agricultural interests should be taken into account when considering the regulation and canalization of streams.

This being the case, I should like to see the resolution worded a little differently. I think that I shall be very close to the text proposed by Professor de Timonoff, and it is also my opinion that a sub-Committee should be appointed to prepare the resolution in its final form. If Mr. de Timonoff's proposition be adopted, I hope that the sub-Committee will take suitably into account the considerations which I have set forth. I give up, therefore, the reading of any draft of a resolution.

The Chairman. — Mr. Vanderlinden has the floor.

Mr. Vanderlinden (in French). — I second, Gentlemen, the words spoken by Mr. Germelmann in praise of the science and talent of the various Reporters and especially of the General Reporter.

The Section must take care, in its conclusions, not to go too much into detail on the one hand, and not to indulge too much in generalities on the other. It should do nothing more than lay down principles.

It seems to me that when a river can be improved by normalization, that is to say: if the desired depth with the wished for breadth can be obtained by giving it a rational form by means of spurs, longitudinal dykes, bottom sills, etc., resort should be had to this method. If canalization be adopted, pools must be created, and to pass from one level to another, works of art must necessarily be traversed, whence delay to navigation. By making the river normal, the seepage from the valley lands takes place under the best conditions.

There are precedents to prove the success of this method; I shall mention the Weser, the Yssel, the Meuse, the Loire, the Rhone, etc. Moreover, according to information confirmed by some reports, one advantage of this method is its relatively small cost. But in certain cases, by giving a regular line, a sufficient depth would not be obtained. If the insufficiency be not too great, it may be asked whether it would not be well to build storage reservoirs. There are examples, especially for the Mississippi above Saint-Paul, where the depth has been increased by 0.35 m, which is enormous. In like manner, the depth of the Weser has been increased, through the action of storage reservoirs, by 0.05, 0.10, 0.15, 0.25 and even 0.35 m. Still, the method by reservoirs may be inapplicable. If it be a question of large rivers with a very small low water discharge, the capacity of the reservoirs would have to be enormous and they would be very costly to build. It appears from Mr. Müller's report that, in order to improve the conditions of navigability on the Austrian Elbe, of which the low water discharge at Aussig is 39 cubic metres per second and more than 4,000 cubic metres in times of flood, the capacity of the reservoirs would have had to be 1,300,000,000 cubic metres, or more than half of the total annual discharge of the river. In like manner, when the country is too flat, as in Holland for example, the method by reservoirs is practically out of the question. The waters from the reservoirs must not take too long to reach the place where they are to be used, otherwise unexpected summer

floods may be aggravated by the discharge from the reservoirs. On the Mississippi, this time varies from 10 to 21 days, which seems to be already excessive.

If normalization, helped out by storage reservoirs, do not give satisfactory results, recourse must be had to canalization which, moreover, has advantages of its own. An examination must also be made as to whether a sufficient depth of water is to be found with the breadth desired. In Holland, for example, the studies of the Dutch engineers showed that canalization will have to be resorted to above Venlo.

We come now to the method which is particularly dear to my eminent colleague Mr. de Timonoff; I mean dredging. This may be considered from two different points of view :

- 1° As a means of execution;
- 2° As a method of improvement.

So far as dredging, *as a means of execution*, is concerned, whatever may be the method of improvement employed, the needs of navigation can be satisfied at once. From this point of view, dredging is extremely useful and I understand that its partisans should become more and more numerous. By dredging the bars of a normalized river, the depth sought is obtained at once and without having to wait for the effect of a flood. When a bar is too hard to be cut down by the current, dredging must be used.

Let dredging be looked at now as a *method of improvement*. By dredging a cut through a bar, the desired depth is obtained at once, but this result is only reached at the end of a certain time for the reason that dredging this cut has not changed at all the conditions above to which the formation of the bar is due, hence the latter will be remade. Mr. de Timonoff recognizes this because, in speaking of the Volga, he says that the depth can be maintained during the entire period of navigation. Furthermore, in order that the current shall bear toward a cut dredged through a bar, this cut must be very large, and if its dimensions be comparable with those of the cross section of the river, there is danger lest the surface of the water be lowered at the same time that the bottom of the river is cut away, especially at a point where the slope is marked. But a large cut dug in a bar of a very wide river cannot cause this drop. Then is the method by dredging justified even when

the slope is heavy. In large rivers, it is, moreover, the only method which can give results.

If none of the methods mentioned above gives satisfactory results, recourse to a lateral canal may be obligatory. This is so, especially, when it is desired to avoid sections of a river in which rapids exist or of which the regimen may be upset by the effect of impetuous torrents or again when conditions at the mouth force this solution (as was the case on the Rhone).

To sum up, I submit the following conclusions for the approval of the Congress :

"If a channel of sufficient width and depth to satisfy the needs of navigation can be obtained, even in low water, by means of regulating works preference should be given to this method of normalization.

" If, with the least width demanded by navigation, the depth of the channel obtained by normalization of the river be somewhat insufficient, this insufficiency can be caused to disappear by the construction of storage reservoirs provided, be it understood, that the topographical situation of the ground adapt itself thereto and that the lack of depth be not too great.

" If normalization, subsequently assisted by storage reservoirs, cannot give a sufficient depth, canalization, if it can be carried out, should be resorted to.

" So far as dredging is concerned, it can be adopted usefully, as a means of execution, to the end of obtaining quickly the depth aimed at by normalization. Even if the method of normalization be applied, dredging may become indispensable, especially with a view to causing the removal of bars which are too hard to be cut down by the current.

" Dredging, with the subsidiary assistance of a few fixed works, gives the only practicable means for improving the conditions of navigability of broad rivers where the transverse bars become very long.

" The lateral canal, always very expensive, is justifiable only in the case when none of the methods mentioned above can insure a sufficient depth for navigation."

The Chairman. — Mr. Bouvaist has the floor.

Mr. Bouvaist (in French). — The first question submitted to the first Section of the Congress puts forth a general problem for which it seems to me impossible to find a general solution. This problem involves, on the contrary, as many solutions as there are special cases, and, the solutions differing from each other as a rule, care must be taken not to assume, as some seem to have, at times, a tendency to do, that, having any given river, an attempt should first be made to regulate the bed by dredging, by permanent works or by reservoirs carried out separately or combined together, then to canalize it by means of locks and dams, if regulating works do not suffice, and, finally to resort to the lateral canal only when it is absolutely impossible to do anything else.

First of all, sections of rivers which place an inland port in communication with the sea should be left out of our examination; they come under the head of ocean navigation. Sections of rivers which feel the action of the tide should, by analogy, be classified in the same category.

These sections disposed of, the first examination will have to be, not only whether the conditions of slope, low water discharge, mobility of the bed, allow the consideration of the possibility of obtaining an improvement of the depth of water which, as a rule, will be small and will, after all, only give an insignificant amount (0.80 m to 1.50 m on the Oder — 0.65 to 1 metre on the Weser, which it is hoped to bring from 1.10 m to 1.60 m — 1.40 m on the Loire — 2 metres on the Yssel — 1.60 m on the Meuse — 1.42 to 2.10 m on the Volga), but also — and this is a point which has been overlooked — whether, on account of the regulated stream being in communication with a system of deep navigable highways, mere regulation would not render obligatory the use of two different sets of water craft and, at the junction, the transfer, of the freight carried by one set to the vessels belonging to the other.

If the river considered be sufficiently long and important to justify the formation of a special flotilla of boats of a certain type, to run long distances and to furnish a traffic more or less great, improvement by regulation of the bed will be justified. But each river will have to be treated according to circumstances and by a system suited to its conditions.

Dredging, which has given excellent results on the Volga where the slope is as light as 0.04 m or 0.05 m per kilometre and the mean discharge varies from 232 to 2,752 cubic metres, would have given no permanent result on the Loire of which the slope below the Maine does not exceed 0.16 m and of which the low water discharge is only 100 cubic metres.

Reservoirs which could be recommended for the Weser and the Volga, by reason of very special topographic conditions, would be out of the question or of no account in Holland or in France.

Hence the system of regulation seems, after all, applicable to a limited number of very large streams.

So soon as the conditions necessary for the application of this system are no longer to be had, it is impossible to give, in a general way and before careful study, the preference to canalization rather than to a lateral canal, or to state that the former will cost less than the latter as a rule. The canalization of the Loire or the Rhone would be more expensive than a lateral canal because, in the case of the Loire, of its width (500 metres), of the ease with which its bed can be scoured, of its relatively small slope and of the impossibility of adopting high lifts without injury to the very productive valley lands, and in the case of the Rhone because of its great slope which would involve many works, especially locks and dams. Moreover, the canal must be preferred in many cases for small rivers already canalized or not—at least in France. For example; the Cher which is canalized with a depth of 1.20 m, should be replaced by a canal if the depth were increased to 2.20 m. The canal is sheltered from overflows, has not the bends of a river, allows the number of locks to be reduced by using lifts of 8 to 10 metres, and offers no current to oppose traction up stream. These advantages quite make up for the few which are invoked in favor of canalization.

As to the choice of the system to be adopted, canalization or canal, the cost, all else being equal, will be the sole deciding factor.

CONCLUSIONS

1. — *The method to be adopted for the construction of a navigable highway: improvement by regulation of streams; canalization of a river or construction of a lateral canal, is a problem for which there is no general solution, but which will have to be solved, as a rule, differently in each case considered.*

2. — *The system of regulation seems applicable to only a limited number of large streams, having a suitable slope, discharge and bottom, on which the length of the trip and the amount of traffic would allow the creation of a flotilla of boats of heavy tonnage and drawing comparatively little water, if needs be, which would not require much in the way of transshipment at the junctions with channels of a different type. The exclusive or simultaneous use of dredging, of permanent works or of reservoirs for this regulation, cannot be subjected to any general rules.*

3. — *For the case in which this system is not applicable, a comparative study should be made of the expenses which would be caused either by canalization or by the construction of a lateral canal, and the one of these two processes which will cost the less and still satisfy the necessities of navigation should be adopted.*

The Chairman. — Mr. Engels has the floor.

Mr. Engels (in German). — Gentlemen, I do not care to enter into a profound discussion of the question which we have in hand; I think too that I can dispense with giving voice to general considerations; in fact, as specialists in the subject, we are all agreed, undoubtedly, as to what concerns the general and essential points. I think that there would be no use in discussing the question of knowing when a river should be regulated, when it should be canalized, when, in considering canalization, resort should be had to lateral canals, when, by additional water supply coming from storage reservoirs, an improvement of the regimen of a river can be reached, etc... I believe that a capable engineer is in position to find the proper solution in each individual case.

I should like merely to say a word about the report of Mr. de Timonoff who, so far back as the Congress of Navigation held at Paris

in 1900, spoke in favor of the method of regulation for rivers by mere dredging. Mr. de Timonoff had referred at this time to the work of the French engineer Pasqueau who had spoken in 1889, of a law of *the call of the waters*. It seems to me that Mr. de Timonoff has lost sight of the fact that Pasqueau, when he enunciated this law, thought only of the needs in time of flood. In such basins, but exclusively in basins of this kind, the volume of the flood waters can actually be increased by means of a suitably dredged channel. But Pasqueau's enunciation on the subject of the call of the waters would become a dangerous law and one to be received with caution, if it were to be generalized as Mr. de Timonoff has done. Objections against this generalization were raised as much as 12 years ago. Mr. von Doeming, among others, has already called attention to this point that, for streams like the Volga, dredging alone may appear, perhaps, appropriate, but that great successes have been achieved in Germany by the method of simultaneous dredging and regulation. Mr. Vander Vin brought out clearly, at this same time, that there really exists no law of the call of the waters and that the phenomena of the movement of water in streams are rather brought about purely and simply by pressures. As to the assertion made in their report by Messrs. de Timonoff and Kleiber, that the method by dredging was still wholly unknown in 1888, I must say that, long before this time, this method had been applied in Germany on a large scale. I will recall to mind that, toward the middle of the last century, Hamburg improved the navigable channel of the lower Elbe almost exclusively by dredging. But one fact which is notorious is this, that Hamburg took advantage of the greater liberty of action granted by the last contract made with Prussia to fix for henceforth, by means of regulating works, the results obtained by dredging.

I should also like to remark that the conviction has been reached at Bremen that the dredging on the outer Weser should be seconded by proper regulating works. Extensive dredging works have been in order in Germany, but regulating works have also been carried on at the same time when this was possible.

In all cases when there nothing to oppose it, regulating works and dredging should go on *pari passu*: the depths should be

obtained by dredging and maintained by regulation. It is only when rivers are so wide and powerful that all attempt at regulating must be given up, that dredging remains as the sole method of improvement. This is the opinion already uttered more than 50 years ago by our old master Gotthilf Hagen, in his well known treatise. But even in this case, dredging cannot dispense with a resort to defending the banks. Even there, where ground is of no value, the consolidation of the banks is necessary in the interest of the improvement of the stream.

In the matter of the importance of the tests made on models for the arrangement of streams, I am happy to agree fully with Mr. de Timonoff, and I thank him for what he has said. Those who have followed my works in the course of the last twenty years, will understand easily my sentiments on this subject. *It would be particularly pleasant for me to hear a discussion by the next Congress of the question of trials on models for river constructions and the results obtained thereby.*

The Chairman. — Mr. Valentini has the floor.

Mr. Valentini (in French). — I thank the eminent General Reporter for the support given to nearly all my conclusions.

Perhaps I did not express myself with sufficient clearness, or else my intention escaped the eminent Reporter, in the matter of the great importance which dredging offers in practice, mainly in view of the difficulty of providing with exactness, by calculation and analysis, just the section to be given to the river.

In any case, I cannot thank the General Reporter sufficiently for having brought out my ideas of the importance of the economic side of the question. As a matter of fact, it is admitted universally that the slope and the discharge are the factors which determine the limits beyond which the regulation of a river is no longer possible and its canalization becomes necessary. The importance of the economic point of view is not always taken into account, nor is it always remembered that, for any regulation, the slope should never exceed the limit beyond which the effort of towing boats up stream becomes greater than the effort of drawing an equivalent railway train, because, when that point is reached, navigation can no longer compete with the railway.

In conclusion, and in view of the great importance of the question, I beg the Section to adopt the proposition just put forth by Mr. de Timonoff, viz : that, before voting any conclusions, a sub-committee be appointed to state these conclusions in a definitive form.

The Chairman. — Mr. Morris Knowles has the floor.

Mr. Morris Knowles (in English). — It is very gratifying to the Pittsburg Flood Commission to note the emphasis laid by the numerous papers presented upon the important part which reservoirs play in foreign countries in the regulation of the flow of navigable rivers.

Of special interest are the remarks by Bohuslav Muller, M. P., in the paper n° 3 bis, page 2, in which he says regarding to " Improvement of the navigability of the Elbe " in Bohemia, by means of impounding Reservoirs that

" It was silently accepted that the natural flow-off remains
" undisturbed in regard to the river flow; from which resulted
" that the canalisation system is in position to secure the required
" depth independent of the latter... However, there is a method
" making it possible to reduce the natural limit of the regulation
" work—namely, by raising the river flow at low water times artificially. For this purpose impounding reservoirs, by which means
" the surplus water of floods are stored, serve to feed the river
" flow during times of drought, and in this manner raise the navigability. "

Also the remarks of C. Valentini, in Paper n° 9, page 10, in which he says:

" The canalisation of a river may become superfluous in all
" cases where circumstances enable the volume of flow at low
" water to be increased by drawing water from a lake or by the
" construction of artificial reservoirs. "

The Pittsburg Flood Commission believes that it has found several such cases in its investigation.

Also the remarks of Leo Sympher, in paper n° 2, relative to the necessity of the supply of *make-up-water* from impounding reservoirs to increase the low water stage of the Weser and secure many

corelated benefits. Upon page 16 he mentions many of these benefits of which the first two are particularly for the purpose of aiding navigability. The resolution presented upon page 35 by this author is directly in harmony with the purposes of the Pittsburg Flood Commission and is just what they are endeavoring to secure from the present United States Congress. A Bill is at present being considered authorizing such investigation. The resolution reads as follows:

" In the preparation of plans for the rendering navigable of rivers, it is advisable, under conditions that appear suitable, that the question be gone into, whether and in what degree a regulation made by the aid of make-up-water from reservoirs is possible, and whether it is to be preferred to a canalisation ".

Particular attention should be paid to the remarks of the world-wide authority Mr. de Timonoff of St. Petersburg, who says in paper n° 11, upon page 70, that the navigability of rivers can be improved among various ways by " increase of depth by an additional water supply furnished by storage reservoirs. " He also states upon page 40.

" Hold back and storage reservoirs, intended to increase the " low water discharge, and, in certain special cases, to reduce the " height of floods, appear among the means offered to improve " regimen and the conditions of navigability of river. Applica- " tions of this system have been made successfully, others are " proposed; and this method, which possesses, in addition, the " advantage of creating reserves of power, which the advance of " science is now able to utilize, should be recommended to the atten- " tion of engineers and governments."

Because of all these examples and opinions of noted authorities the Pittsburg Flood Commission has no sympathy with the remarks of Major William W. Harts in paper n° 4, in which he says upon page 18, that it is, more or less debatable whether " enough high " dams can be safely built at reasonable cost free from the danger " of a breach, operated intelligently and efficiently in order to " create the necessary storage space for regulating the discharge ".

Nor with his conclusions on page 23 when he says:

" Reservoirs are too *uncertain*, too *unsafe*, and too expensive " for exclusive use in river improvement. They will seldom be relied

" upon, except in special cases in connection with other enterprises
" where their use for industrial purposes warrants the cost and the
" water flow can be sufficiently controlled to operate beneficially
" on the channels. "

Numerous examples abroad for all purposes, including navigable ones; and various projects in our own country operated for power, for irrigation, and for municipal water supply, all prove these fears to be false.

To agree would argue our own unfamiliarity with the notable and excellent works of great engineering skill (with which our foreign brethren are undoubtedly acquainted), upon the great irrigation projects of the west and the water supply system of the large Metropolitan districts of New York and Boston.

Of the work of the Pittsburg Flood Commission we hope to tell you more in detail when you come to Pittsburg, where I assure you, you will be most welcome. It is sufficient to say here that, after 50 years of academic discussion and many attempts to secure Governmental investigation of this problem, the citizenship of Pittsburg has just concluded an investigation costing \$125,000, and spent four years time. Our studies have shown that for the 19,000 square miles of drainage area upon the Alleghany and Monongahela Basins, a very large proportion of the entire Ohio Basin, forty three possible sites for reservoirs have been found, studied and contoured, and dams of not unusual height are possible. It was latter determined that seventeen of these reservoirs would be most effective in results at Pittsburg. These would store 60,000,000,000 cubic feet at an estimated cost of about \$22,000,000 and would reduce the peak of the floods at Pittsburg an average of ten feet. Of more importance still, however, and of interest to this Congress is that the low water flow of the Alleghany River could be thus increased three and one half times, and that of the Monongahela River six times over the minimum. At Wheeling, West Virginia on the Ohio River sixty miles below Pittsburg, the increase would be three times, which would correspond to raising the height of water 2, 3 feet in the lowest period of the summer time. Forty three sites would of course cause even greater effect, and as similar opportunities exist upon other tributaries of the Ohio River, we believe that solution has been offered which should engage the attention of the Government authorities for this purpose.

If any questions have been stimulated or suggest themselves by this short discussion, the Pittsburgh Flood Commission will welcome inquiries to be sent to their office, 18 Floor, Arrott Building, Pittsburgh, and we will endeavor to see that they are answered in the talk to be given Thursday evening, May 30th, when you are in Pittsburgh.

The Chairman. — Mr. Sanjust di Teulada has the floor.

Mr. Sanjust di Teulada (in French). — I have nothing to add to what has been said by the eminent speakers who have preceded me, consequently, I take the floor merely to make a simple motion. The preceding speakers agree in their conclusions; they state that no complete and exact solution can be given to the matter in hand. Now, as a member of the Permanent International Board, I know the importance of the preparatory work which has to be done in order that, among the numerous questions proposed, those may be selected which will bring about a useful discussion and a practical solution.

In spite of this, paragraph d) of No. 7 of the conclusions of the General Reporter asks that the present question be kept on the order of business of the next Congress. I propose formally, therefore, in order that the sub-Committee appointed to prepare the final conclusions may decide upon them as it thinks best, that this subject appear no more among the questions, but that it be carried among the communications on the programme, because it is necessary to become acquainted with the new solutions adopted in different cases and in different countries. As a matter of fact, it is superfluous to go on arguing over a general solution which it is impossible to give, either under an exact, mathematical form, or under a practical form.

The Chairman. — Mr. Grant has the floor.

Mr. Kenneth C. Grant (in English). — It has been stated in the conclusions of the last of the papers of this subject, presented by Messrs Timonoff and Kleiber, that "the navigability of rivers can be improved by various methods", and that "the choice of one of these methods rather than another depends upon the special cir-

cumstances of each particular case". The same opinion is expressed in conclusion n° 1 of Colonel Newcomer, the General Reviewer, namely, "No single method of improving the navigability of a river has superior advantages in all cases, but each may in turn be found most satisfactory under special conditions". This conclusion should be the guide and keynote of all discussion of this subject.

It is intended in what follows to speak mainly of the relation of storage reservoirs to navigation. In the various papers presented, this portion of the subject has been considered in several ways.

In the paper of Major Harts, reservoirs are put to the test of being the exclusive method of improving rivers for navigation. They are dealt with in the general case, rather than in the special favorable cases, as recommended in the conclusions alluded to above. They are not given opportunity to demonstrate their benefits to navigation when combined with and supplementary to other works of river improvement.

It is apparently from this point of view that Major Harts claims that reservoirs are unsatisfactory as an aid to navigation. A number of reasons why they are not desirable are given. Some of these objections would be common to all localities and to all rivers. Some would obtain only on special streams. They are all marshalled as a general objection to the reservoir method of river improvement, whereas the reservoir method would of course only be selected where conditions are favorable, i. e. where these objections do not prevail. It cannot justly be claimed, therefore, that reservoirs as a means of improving the navigability of rivers are therefore never applicable.

It is true that certain drainage basins are not suited for reservoir construction. The topography may be unfavorable, or the damages by overflow may be too great. It is just as true, however, that other drainage basins are especially suited for reservoir construction : and the objections cannot fairly be made universal, when the objectionable conditions cited are absent in many localities. The same criticism applies to the claim that the reservoirs would quickly be filled with silt ; and as well also to the claim that increased discharge would not mean increased depth.

The objection that there would be danger of dam failures must certainly be set aside by every engineer familiar with the construction of large dams. This objection and that claiming that the reservoirs would quickly be filled with silt do not seem to prevent the construction of numerous reservoirs for other purposes all over the world. The Panama Canal itself is dependent upon the stability of a great dam and upon the permanency of the storage capacity created thereby.

The paper of Dr. Sympher considers the use of storage reservoirs in another way, namely, in combination with and supplemental to works for river regulation. It shows the results that are to be obtained by such works on the Weser River in Germany.

There is a striking difference of opinion between Dr Sympher and Major Harts as to how much increase in stage constitutes a benefit to navigation. On the Weser an increase of four inches in depth for a considerable stretch below Minden, to be obtained by regulation, is spoken of by Dr. Sympher as being « of great importance», although the distance from Minden to Bremen is only about 103 miles. On the other hand, Major Harts considers that the effect of the Mississippi Reservoirs, which cost only about \$678,000 or less than one third the amount proposed to be expended for the regulation of the Weser from Minden to Bremen, is slight. Yet, as he states, this increase in stage on the Mississippi is from 12 to 14 inches for 367 miles above St. Paul, and its effect extends, in lesser amount, for fifty miles further down stream. On the Weser, the following increases of stage, to be obtained by means of regulation costing \$2,500,000 are considered by Dr. Sympher to be of great benefit and importance to navigation.

	Distance		Increase in stage	
Münden to Carlshafen	28	miles	4	inches
Carlshafen to Hameln	56	miles	6	inches
Hameln to Minden	41	miles	8	inches
Minden to Mouth of Aller R.	77.5	miles	13 3/4	inches
Mouth of Aller to near Bremen.	16.1	miles	27 5/8	inches

The above increases in stage will be further increased by the water released from two reservoirs now under construction, on

the Eder and on the Diemal, at a cost of about \$5,500,000. The following are the additional increases of stage thus to be obtained. They are spoken of by Dr. Sympher as being important.

Münden to Carlshafen	28	miles	15 3/4	inches
Carlshafen to Hameln	56	miles	12	inches
Hameln to Minden	41	miles	9.84	inches
Minden to Mouth of Aller R.	77.5	miles	6	inches
Mouth of Aller to near Bremen.	16.1	miles	2	inches

And this, it must be born in mind, will be upon a thoroughly regulated river, where, as stated by Dr. Sympher, reservoirs have their greatest effect and are most successful in improving the low-water flow. An increase in stage of from 12 to 14 inches for 357 miles upon a stretch of the Mississippi practically unregulated, when compared with the proposed improvements on the Weser, does not therefore seem to be of such slight importance. Its importance to commerce may be slight in this particular case, because there is little commerce to be benefitted; but it should be a convincing practical illustration of the fact that a considerable and an important increase of stage can be obtained by means of reservoir storage.

It has been stated by Major Harts that "experience in the application of the reservoir theory has been unsatisfactory". The Mississippi reservoirs are the *only* practical application of the reservoir method of river improvement in this country. From the above it would seem that this one practical application *has* been a success in giving a considerable increase in river stage, greater in amount and in length of river improved than increases that will be obtained by works now being constructed on the Weser at a cost of nearly twelve times that of the Mississippi reservoirs.

It follows that if a similar improvement can be made by reservoirs on other rivers where river traffic *does* exist, or can be created or increased, a great benefit to navigation and interstate commerce must result; and that proper consideration and study should be given to this method of river improvement in this country, or to its proper combination with other methods.

The *theories* with regard to the reservoir idea seem to have been three:

1. That reservoirs *would not* be successful for river regulation.
2. That reservoirs *would be* successful for river regulation; but that suitable sites could not be found, or if available would be too costly.
3. That reservoirs *would* be successful for river regulation; and that there are certain rivers upon the drainage basin of which suitable sites of sufficiently great capacity and sufficiently reasonable cost are available.

During the past sixty years many papers have been written upon this subject by supporters of each of these theories. In all cases *opinions* only were expressed. Actual surveys and detailed studies were lacking to support these opinions and to justify the apparent tone of finality with which the conclusions have in some cases been expressed. Some of these papers confined themselves to forcibly calling attention to possibilities, and bespoke for the reservoir idea a suitable detailed study and survey.

Only the third theory has been adequately and completely carried beyond the "theory" and "opinion" stage. The Flood Commission of Pittsburg has just published its report containing the results of detailed surveys and investigations covering a period of several years, made at a cost of about \$125,000. These studies have proved that floods in the Allegheny, Monongahela and Upper Ohio Rivers can be controlled by storage reservoirs at a cost that would be far outweighed by the benefits to be derived. The one feature of flood control at Pittsburg alone would justify the necessary expenditure of \$20,000,000. The collateral benefits to navigation, water power, sanitation, and domestic and industrial water supply would still further justify the expenditure; as would also the benefits of flood relief that would be extended to other communities on the rivers above and below Pittsburg.

The admirable paper of Dr. Sympher shows the benefits to navigation to be obtained in a special case by a combination of reservoirs and river regulation. Another combination of great importance in special cases is that of reservoirs and slack water.

The slack water improvements on the Monongahela River suffer during low water from inadequate discharge, and commerce is seriously interrupted. The proposed reservoirs would increase

the minimum flow of the Monongahela six-fold. By additional storage found available at reasonable cost this increase could be raised to fifteen times the minimum.

The proposed reservoirs would give an increase of 2.3 feet in open-river stage in the Ohio River at Wheeling, ninety miles below Pittsburg. If all the storage found available above Pittsburg were constructed, this increase in the Wheeling stage would be 3.7 feet. If this method of river improvement were combined with the slack water method now under construction on the Ohio at a cost of about \$73,000,000, it is certain that fewer locks and dams would be necessary, there would be a longer period of open-river navigation, greatly facilitating the movement of coal fleets and other traffic, and an ample flow to provide uninterrupted, pool-full navigation would be at all times assured.

The Allegheny River is slack-watered for twenty four miles above the mouth by means of three locks and dams. The proposed reservoirs would greatly improve the present intermittent open-river navigation above the head of slack water. In the event of the extension of the slack water system further up the river, which is being urged by those interested, the increase in low-water flow that would be obtained by the reservoirs would unquestionably reduce the number of locks and dams required.

The construction of three locks and dams on the Youghiogheny River, a tributary of the Monongahela entering 15 miles above Pittsburg, was authorized two years ago at an estimated cost of \$1,050,000. This will give 18 miles of slack water, up to West Newton. No work has as yet been started on this project, but if the navigation dams are built, it is certain that the low-water flow will not be adequate for their operation without reservoir assistance. Serious troubles have been experienced on the Monongahela, with over ten times the minimum discharge of the Youghiogheny. The proposed reservoirs would increase the low-water flow of the Youghiogheny to about ten times its present minimum; and if all the reservoirs found available were built, to thirty-eight times its present minimum.

In considering the benefit of storage reservoirs to navigation it is also necessary to give due weight to the benefits that must result from a reduction in flood heights, viz. increased clearan-

ces under bridges, reduced danger to vessels under way or at moorings on account of less velocity of current, and improved conditions at river terminals due to less fluctuation in river stages.

In conclusion it is desired to bespeak the broadest possible treatment in the development of our rivers. The co-ordination and harmonization of all the uses of the rivers should be the aim in all plans for improvement. Plans for navigation works on a river and the selection of the method or methods of such improvement should take into account the problems of flood control, water supply, water power and sanitation.

The Chairman. — Major Harts has the floor.

Major W. W. Harts (in English). — Mr. President; The question of reservoirs has been studied for many years. There seems to be no doubt that the protection of low lying lands against flood is an important question, and if it could be solved by this method the result would be extremely important. There is a great deal of misunderstanding with regard to reservoirs as a means of protection for low lands. Many people have thought that the theories under which reservoirs were required could be accepted, after an understanding of conditions and of suitable positions, and they have also thought that this would be sufficient and that these theories would apply in practice; but it seems to me that theories can scarcely be applied invariably to this subject. It seems to me that we must look for more examples on which to base a theory. There are only two examples of this method in the world, one on the Mississippi and the other on the Volga, and these are the only two illustrations of their use on a large scale, when backed by natural conditions which made the construction of dams not only satisfactory but cheap.

These conditions do not exist everywhere; and it may be said safely that the construction of reservoirs is especially advisable in those sections where dams can be built at small cost.

Furthermore, when the works to be carried out on the Rhone were under study, this method of protection against floods was considered, but it was abandoned by the French engineers in the

neighborhood of 1880. The question of the control of floods was important in the case considered and it has so remained, as it has with us; the Engineers were led to the conclusion that the use of reservoirs was uncertain. Furthermore, the question of cost was a second important factor which led to the abandonment of the method. In our country, the cost would also be frequently too great.

Floods are sometimes due to a cause which has not yet been brought out during the present discussion : the denudation of lands lying at high altitudes, by cutting down the forests, but this is a much more complicated matter. It may be one of the reasons but is not an important one. The main reason is that, in some of the important centers where we have manufactories and a large population, such as Pittsburg, the flow of the river has been impeded; it has been throttled to such an extent that the water, instead of being permitted to escape, is piled up in reservoirs, so to speak.

While in charge of the Cumberland and Tennessee Rivers it was my pleasure to study the natural conditions existing on those streams in the matter of floods, whether they were increasing or decreasing in proportion to the influence of these conditions. Contrary to my expectations, the facts were just the reverse of what I thought they would be. Great tracts of land in the higher parts of the Appalachian regions had been stripped of their vegetation, but this denudation had no influence on the floods. It seems wise, however, not to accept any such conclusion from this fact, but rather to admit simply that the question of low water or high water is one of rain fall.

The needs of important navigation have also been raised. If increased depth could be obtained by the use of reservoirs at all seasons of the year, at a reasonable cost, there is no doubt that this method could be profitably applied. We have seen it used on our greatest streams, but the results were not satisfactory because it increased the depths on portions where the navigation was unimportant, but did not give a sufficient depth in those portions where it was more intense. On the other hand we find that other methods which have been applied in Germany, in France and in many other countries of the Old World, are sure, certain and within reasonable cost.

Hence it seems very questionable whether the method of reservoirs be worth the expense involved, or whether anything more can be done practically than carefully to study these questions in order that we may not be led to introduce expensive and complex systems which are based merely upon a theory, and not upon wide experience.

The Chairman. — General Bixby has the floor.

Brigadier General W. H. Bixby (in English). — Gentlemen, I do not care to go into any extended discussion of this subject, as some of the rest of you have done, because in my mind the recommendations of the General Reporter seem thoroughly sound; and the very first of them all appears, to my mind, of more importance than any of the others, and this is : that the choice of the method finally to be followed in the final improvement of rivers *depends almost entirely on local circumstances.*

It may be well to go into a further discussion of recommendation n° 3 of the reporter, as to the limits where one method may be better than another; but this discussion, however, will apply only to the minor details. The general subject seems pretty well settled.

Perhaps, I might modify the last recommendation of the Reporter, n° 7, by suggesting that the further discussion follow the lines recommended by Professor Timonoff. Everything which refers to navigation in the United States, seems to me largely dependent on *local conditions, and on the characteristics of the region through which the river flows*; and the choice between the different methods of improvement and the extent to which amelioration shall be carried, will depend, almost entirely, upon the extent to which the country is populated, upon the kind of merchandise to be transported over the river and upon the local surroundings.

These are really not engineering questions; they are commercial questions which must precede the engineering ones. There are still in existence in the United States, far more than in Europe, a great many rivers where boat service is at present prevented by natural obstructions : such as fallen trees, snags, occasional

rocks, or bars whose soil is too hard to be removed by the river currents, but the removal of which would open the river to considerable use during the months of the year when fertilizers can be brought to the farmers along its banks, and also would open the river during the months of the year when it would serve for the transportation of farm products to market, this being most important at the end of the agricultural season. If we can, in such a way, secure to the farmers a fair navigation of the stream, with a limited draught, during six months of the year, the stream will be of appreciable use.

We do not, for purposes of navigation, care so much in the United States whether the river is navigable in time of flood or in time of drought; but we need *navigation during the busy months of the year*. Navigation in time of drought is only desirable when there is something to be carried to the farm, for instance, or while there is something to be taken away from the farm to market.

Every one here will agree to the fact that the first step toward the improvement of a river, such as I have referred to, will give wonderfully beneficial results, even with a limited draught; and everybody agrees that the first improvement should be the removal of natural obstructions and the use of the dredge.

It is only after we have developed a country, and after this country has been settled and become thickly populated, that we need to consider the next two steps of river improvements, which are really those before this Congress for discussion; and then we need to submit: whether the first amelioration shall be by methods of straightening the channel, by narrowing it, or by deepening it by dredging; or whether by use of lateral canals, or of locks and dams. There is one point of considerable importance, which is, that when we use locks and dams we obtain pools of great length, sometimes 25 kilometres, and that in the lower half of those pools the gain in speed, which is possible with the extra depth which we obtain by the pool, is of immense value to navigation and more than sufficient to make up for all the advantages which could be secured by a lateral canal. Besides, in many parts of the United States, for example on the Mississippi, if we should attempt to use lateral canals they would pass often at long distances from the large cities already located on the rivers. It is impor-

tant to keep our boat travel near to those large cities. These points are important ones when we talk of putting in a dam and a lock, instead of a lateral canal. The speed of the navigation and the nearness to cities are very important elements.

Now, with reference to reservoirs; the United States has always admitted, and did so when we built the first reservoirs on the Mississippi, that they are very useful as a supplement to the improved river after all the other methods have been pushed to the end; after their improvements have been obtained. If there is a demand for boats every day of the year, then we begin to consider how much each additional dollar of expenditure will increase the draught. We have, in the United States, two places which are especially referred to in connection with reservoirs. One is the *Upper Mississippi*; the other is the *Upper Ohio* (the Allegheny and the Monongahela), and, for the benefit of the foreign members of the Congress, I ought to say that the improvement of the Upper Mississippi by the construction of reservoirs, to help out the water flow in droughts, was considered at a time when land was of almost no value whatever. If we should try to build reservoirs on the Upper Mississippi today it would cost us many times the original amount spent. Secondly, on the Upper Mississippi, the portion of the river which has been benefited most in draught lies in regions where there is no boat navigation, has not been, and will not be for many years; and while the reservoirs were put there under the guise of assisting navigation, they were constructed really to create water power all the way down the river rather than to use that river for purposes of navigation. On the Ohio, above Pittsburgh, the question is still academic; as there are no reservoirs there except on paper. After they shall have been built, we might find that the actual cost has been two or three times the estimated cost; after they shall have been built, we might also find the depth to be only a fraction of what we hoped it to be. So far as navigation improvement is concerned, the present theory shows some possible benefit to navigation; but it looks as if not more than one third of the benefit will be for navigation; the rest of it being for the development of hydro-electric power works and for the protection of cities along the banks from inundation. I might say only one-sixth of it will be for the benefit of navigation.

and the other five-sixths, or pretty nearly that ratio, will be for other purposes ; so that only one-sixth is really a question of navigation. To-day, with a well known and well tested system of locks and dams, definitely settled on from Pittsburg down to Cairo, and one third built or started, we do not need to consider, at the present time, the question of reservoirs on the Ohio. If we were in a country like Europe, where land is scarce or where the population is very great as compared to that of the United States, we might look at the question of reservoirs somewhat differently, but not today.

The Chairman. — Mr. Ripley of the New-York State Barge Canal Consulting Board has the floor.

Mr. Ripley (in English). — Mr. Chairman and Gentlemen; It seems to me that we have struck the keynote of this question, as regards the United States at least. I had the pleasure of living along the Ohio River for five years and doing work on that river as an engineer. I was a little at a loss to understand, at first, how they were going to get the regulation of the upper Ohio, classed under the head of "benefit to navigation", for the reason that the town or the city in which I lived and also its neighboring cities have been working for years in an effort to get a regulation to save them from the great loss due to floods.

It is well known to us, but not probably to the foreign members, that a rise of thirty feet above low water on the Ohio River is considered a small rise and that a rise of forty feet is not uncommon. You understand that when you come to put water in any stream in a canyon forty feet above its low water stage you are going to flood out the surrounding country and that is a fact from Pittsburg to Cairo; it is along the entire stream that they are inundated at extremely high water and that their losses run into millions of dollars.

But what I really wish to call your attention to particularly is the work being done in New York State in which, I believe, many of the members here are interested and which many of this part of this section of the Congress will be able to see it inside of the next ten or fifteen days, namely upon the New York State Barge Canal.

There we are improving the rivers as well as going across the country, and we are making inland navigation as well as efforts to better it. General Bixby's statement is an illustration. We are building this canal through a very thickly populated district, at least for the United States, and there all our work is done with locks and dams and we obtain our depths through our storage reservoirs and, in order merely to keep these pools up to their full height, the dams are provided.

The river work there consists in improving the Mohawk River for a distance of about 100 miles, and uniting a length of about 40 miles of the Seneca River with the Oswego River, 45 miles long; the rest of the canal passing through the open country for a total distance of about 400 miles. The same scheme also includes what is known as the Champlain Branch of the Hudson River which reaches northward from Albany. I therefore bespeak your observation of the work being done there with these objects in view, that the work is being done through this thickly populated district and that we will carry on, as it has been carried on for years, a certain amount of through traffic coming from the upper great lakes. One of our lecturers will this afternoon deliver a lecture at the Philadelphia Commercial Museum, on this subject. I have in my room at this hotel, n° 1207, two or three general maps of the canal and if any of the Gentlemen here would care to come to my room I should be glad to show them these maps and thereby they can get a general idea of the route of the canal and of the various locks and the topographic features of the State and they will be somewhat prepared for the lecture on the subject.

The Chairman called upon the General Reporter, Lieut. Col. Newcomer, who took the floor.

Lieut. Col. Newcomer. — Mr. Chairman and Gentlemen,

I have had great cause to regret the handicap under which I labor in not being able to understand French and German. I do not know what these Gentleman have been saying about me this afternoon. However, instead of attempting to reply to any remarks of theirs in connection with this subject, I might say something in regard to the deep interest I have taken in going over these papers which have been submitted by the reporters.

It has been a matter of great pleasure to me. One could not but be impressed by the ability which has been shown in each country in taking up the problems that face the engineers there. In framing my general conclusions I had to avoid placing too much emphasis upon one method rather than upon another. Certain papers presented to the Congress did tend, so it seemed to me, to emphasize unduly certain methods of improvement which indeed, under special conditions, merited all that is said about them, but in attempting to lay down general conclusions or principles which would not offend the propositions due to certain local conditions, and which would command general assent, I framed the Resolutions as they are presented to you. There was practically but one thought which, it seemed to me, there was occasion to add to those presented by the Reporters, and that is one which, possibly, we have taken for granted. The question of justifiable expenditure to be made in any given case. We might all consistently, in considering problems of this kind, consider whether the commerce will justify the cost. You can take any stream for which improvement is suggested and the idea looms up depending on how much money you will spend, and the question is what to do. It seems to me that there should be something in the general conclusions, some reference to what should be done and to the idea of commerce being benefited.

With reference to the question of reservoirs, it seems to me that I might add one remark: and that is upon the conditions of the Ohio River at Pittsburg. Certain demands made by navigation interests represent the minimum that will satisfy their needs. They need a nine foot channel, they claim, for the commerce that is to be borne upon that river. Now, it is simply a physical impossibility to provide a nine-foot channel by means of reservoirs. The total run off from the drainage basin above Pittsburg, if wholly controlled, would be less than nine feet in depth and of course such a total control is absolutely out of the question. There is no doubt whatever that reservoir control, in so far as it may be provided by one means or another, whether for flood purposes, power or water supply, is attended by beneficial results and these we welcome; but where this control is impracticable there is hardly any ground for argument.

The Chairman. — Mr. Wilkinson, President of the Upper Mississippi River Improvement Association has the floor.

Mr. Wilkinson (in english). — Mr. Chairman and Gentlemen; I do not wish to say anything in particular about the Upper Mississippi Improvement Association, but I do desire to call the attention of this body to an engineering work which is being constructed at this time between Keokuk, Iowa, and Hamilton, Illinois, at the foot of the Des Moines Rapids.

It is the building of a dam and a great hydro-electric power plant. This dam completely divides the Mississippi River at this point. It will be practically forty-four hundred feet in length at its crest. There are one hundred and nineteen arches, thirty six feet apart between the centers. This dam, for its entire length, rests upon solid rock and the foundation is cut down into this rock from six to seven feet. The dam is forty-two feet wide at the base, fifty three feet high to the summit and thirty-five feet wide at the top.

In connection with this dam there is building a power house which will be equipped with machinery that will generate three hundred thousand hydro-electric horse-power in thirty units which are of ten thousand horse-power each. The machinery of each unit will weigh practically one million pounds. The main driving shaft of each unit is twenty-five inches in diameter. The draft tubes are formed of concrete and, at their mouth, are thirty-two feet high and forty-two feet wide and of elliptical shape. In constructing the power house it was necessary to build, out in the river, a coffer dam enclosing thirty-five acres and this area was pumped as dry as this floor. The foundations for the draft tubes and the tail-race were sunk thirty-five feet below the bed of the river and, to be sure of their foundation, holes were drilled to a depth of sixty-five feet below that to test the rock, which was found to be of uniform hardness and solidity to that depth.

Built as this dam is and as this power house is, under the guidance of that eminent engineer, Mr. Cooper, whom you doubtless all know, their construction is so solid that it seems as if they would last as long as the world endures. Their foundation is as solid as the rock of Gibraltar.

Mr. Cooper told me a short time ago that he took from a bucket a hand full of concrete last winter and subjected it to all the hard variations of temperature we had during last winter, and this spring he tested it and found it to be eleven times stronger than the requirements. That shows the kind of materials being used in the construction of this dam and power house.

Something over three hundred thousand cubic yards of concrete will be consumed. The rock is taken from the adjacent ground and the cement is brought from Hannibal and they have the best of everything at hand. This work was commenced about fifteen months ago and, on the first of May next year, the power will be turned on.

Here is a work within a small compass which is as large as anything that is at the present time going on in the world except the Panama Canal. There is under construction, for the use of the Government, a lock, which will be as large in its breadth and height as the Panama locks, but not so long. Its length is four hundred feet; the Panama locks are one thousand feet. The width is one hundred and ten feet and the lift is forty feet.

You will, therefore, see that it is a good deal of a lock. In connection with this lock, a dry dock has been built. This is all being done for the purpose of developing power, but the Government gave the charter to this Company to build this dam and to create this plant, and in return for that the Company gives the Government of the United States this lock and dry dock and the power to operate them for nothing. At the present time there is a canal along the bank of the river, six miles in length, in which there are three locks which cost the Government nearly fifty thousand dollars per annum to operate. The operation of this one lock in place of three, as now, will save the Government about forty thousand dollars annually and be a great benefit to navigation in the saving of time to vessels passing up and down the river. The dam will create a pool which will extend sixty miles above it and which will give slack water navigation, with a deep channel, for that distance.

These works are so wonderful in their construction, the constructing plant so perfect, and there are so many vast ideas of intense interest connected with it all, that I am sure that you Gentlemen

would be greatly interested in seeing this work in its present period of construction.

During this session, a formal invitation will be extended to you to visit and inspect this work and to be the guests of the Mississippi River Power Company, and I am sure that if you will take the time to go there you will not only see the Mississippi River, one of the greatest rivers of the world, but you will see the construction of a plant that will well repay you for the time it will take you to go there.

I thank you very much indeed. (*Long and continuous applause.*)

The Chairman. — Directly after adjournment, I shall ask the Gentlemen of the first section of the Congress who have spoken or who have taken part in the discussion, those who have written papers and the General Reporter to remain for a few moments so as to prepare a résumé of the result of what has been done this afternoon.

This first session of the First Section now stands adjourned until Saturday morning at nine thirty A. M.

FIRST SECTION

(Inland Navigation)

SECOND SESSION

Saturday Morning, May 25, 1912

Mr. BOGART in the Chair

The meeting was called to order at 9.30 A. M., in the Assembly Room of the Bellevue-Stratford Hotel.

The Chairman (in English). — Gentlemen, before going on with our work, allow me to mention to you several telegrams which have come to the officers of the Section : it is a question of invitations coming from the Mayor of the city of Pensacola, in the name of his fellow citizens, from the Chamber of Commerce of that City, from a private Society and from the National Bank of the locality, begging the Members of the Congress who intend to visit the Panama Canal to stop at Pensacola for an official reception. It is doubtful, however, whether this reception can be held because the circumstances are scarcely favorable. Be that as it may, the officers will see that appreciative thanks are sent to the Pensacola authorities who have taken so kind an interest in us. This course was approved.

Mr. Vanderlinden (in French). — I should like to be here when the conclusions of the first question are under discussion. I should be glad to know the day and hour when this discussion is to take place.

Mr. Sanjust di Teulada (in French). — It would be well, in order better to follow the discussions, to have the remarks made in English and in German during our sessions translated into French.

I make this request in behalf of my French and Italian colleagues.

The Chairman (in English). — The desires of Messrs. Vanderlinden and Sanjust di Teulada will receive attention.

We shall take up now the **second question** of our programme which is worded as follows :

Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of the locks.

Several reports on this subject have been laid before the Congress by Mr. Germelmann (Germany), Mr. Glaudot (Belgium), Colonel Hodges (United States), Mr. Bourgougnon (France), Mr. Sanjust di Teulada (Italy), Mr. Pouzirevsky (Russia) and Colonel Hansen (1) (Sweden).

Mr. Noble, the General Reporter of the question, has the floor.

Mr. Noble (in English). — Mr. Chairman and Gentlemen; Before reading the conclusions at the end of my report, I must place before you the substance of a letter which I have received, calling attention to a misunderstanding on my part. This letter, which comes from Mr. Jacquinot, Chief Engineer of the Ponts et Chaussées of France, says that its author has not been correctly understood, in connection with the canal from the Marne to the Saône, by the author of one of the reports sent in to the Congress as well as by your General Reporter. The error, according to Mr. Jacquinot, consists in attributing to him the opinion that the canal has been ill built and is of no practical value for commerce. "How could I," he asks, "condemn in this way the work to which I have devoted the major part of my career?" and then he goes on :

"I said," on the contrary, "that the traffic was increasing" steadily (it has tripled during the first four years of operation).

(1) The costs of transportation given in Colonel Hansen's report should be corrected; the value of the Swedish crown is only 2.67 American cents instead of 3.75 cents.

" I added that it would increase much more rapidly still if this
" navigable highway had been provided, from the beginning,
" with all the appliances which would enable it to fulfil the
" important part which it ought to play in the network of the
" French canals. I mentioned, among these appliances, a good
" organization for the traction of boats, not alone on the canal
" itself, but also and especially on the lines previously constructed
" which would act toward it as feeders and as extensions.

" You know that this lack of organization is not special to the
" canal in question; it is, unfortunately, nearly general.

" I would add, also, that one element of importance for the
" prosperity of the canal was lacking : a great inland port at
" Lyons. This again can be generally observed : inland ports are
" wanting in France. This idea has been imperfectly translated
" and makes me say that "the canal was wanting in ports which
" were suitably arranged and equipped".

" Finally, I did not say that the depth of the water was too small
" and the dimensions insufficient. I said, on the contrary, that
" navigation there was exceptionally easy. I added that this
" improvement ought to be carried much further still and that up to
" the present time sufficient consideration had not been given to
" the importance of easy traction on canals."

The Chairman. — These various rectifications will be carefully noted.

Mr. Noble, the General Reporter, (in English). — Here then are the conclusions of my report :

1) *Standard dimensions applying to canals for heavy traffic, permitting interchange of traffic without transshipment, are desirable in any given country, and for adjacent countries where traffic is international to a great extent.*

2) *Assuming suitable ports and facilities for handling freight in all cases as essential for economical transportation, the most suitable dimensions for canals will still depend upon many conditions, and particularly upon the general topography of the country, the nature of the principal items of freight to be transported, and the extent of inter-communication practicable. Such items as grain,*

ores and coal, loaded quickly with machinery at a single point and unloaded with like devices at another, favor the use of large boats, while smaller ones may be better adapted for general merchandise.

3) Where extensive and well coordinated canal systems already exist it may be inadvisable to change, even if larger dimensions would be better adapted to the traffic.

4) These various conditions have led to the adoption for canals in Germany and Italy of dimensions suitable for boats carrying about 600 tons and to the retention in France of dimensions suitable for boats carrying about 300 tons, except in some special cases; in other countries still larger dimensions have been adopted in part.

5) It is not practicable, however, in every country, to establish standard dimensions. The traffic in certain districts may be so different in character and volume from that in other districts as to require special accomodation. Where interchange of traffic is impracticable, uniformity in canal dimensions is of less importance.

6) The question whether canals shall be free from tolls, or what proportion of the general costs of furnishing and maintaining the waterway shall be borne by the State, is governed by the policy of the State.

7) The organization of responsible transportation companies for canals which form links in trade routes, under suitable control by the State, should be encouraged.

8) Movement of boats by power is desirable in canals with heavy traffic, and is necessary if the boats are large. Where boats are towed in trains by tugs or from the tow-path by electric tractors, the organization of monopolies for haulage, operating under State control, would be advantageous.

9) Increased traffic capacity of the locks of canal systems can be obtained advantageously by adapting them for locking two or more boats at one time.

10 The dimensions to be given to locks of short canals flanking rapids in rivers will depend on the widely varying character of the traffic, the water supply usually being ample. Where the prevailing traffic is in barges of moderate size, moving in large fleets, as on the Ohio River, it is desirable to have dimensions sufficient to pass a considerable number of boats at one lockage. Each case must be studied by itself and no general rule can be laid down.

11) *For a heavy traffic, the equipment of locks for operation by power is desirable. The equipment should be as simple as compatible with effective and safe operation.*

12) *In certain cases, as where the level above the lock is connected with a large body of water, or where the unrestricted flow from the upper level would be disastrous to the canal works or to adjacent property, means should be provided for quickly stopping the flow.*

Mr. Sanjust di Teulada (in French). — Gentlemen; Before taking up the discussion of the conclusions laid down by the General Reporter, whom I thank for the accuracy with which he has summed up my report, I think that I should dwell, before the Section, on the contents of Mr. Jacquinot's letter which was read to you a moment ago.

The rectifications made by Mr. Jacquinot only confirm the necessity of having two very important installations on any canal: *that of well equipped ports and the most perfect service of traction that it is possible to obtain.*

A very simple comparison with the best navigable highway in the world, the ocean, shows the truth of this assertion.

In fact, traffic only develops on given coasts between points where there are properly equipped ports, and traffic becomes greater and greater if the ships are of heavy tonnage and the means for handling freight are the most nearly perfect possible.

So, the conclusions of my report are unchanged.

I shall go on now to the general conclusions to be adopted in regard to the question now before us.

When the question of the tonnage of ships and the size of canals and locks was placed on the order of business by the Permanent Board of our Association, the guiding thought was to determine this tonnage and these dimensions *for intercommunicating systems* in some one given part of the world. It is evident that dimensions which suit European countries could not be equally appropriate for an American or an Asiatic system, or, in general, for any system at all which has no direct communications with other groups of canals.

The conclusions ought, therefore, to take this case into consideration.

The same is true in the *matter of operating*. Such or such a mode of operating, compatible with European legislation and with the manners and traditions of the old world, will be inapplicable, very likely, in America and *vice versa*.

The conclusions proposed by the General Reporter take these considerations into account up to a certain point, but I think that it would be well to bring out the practical utility of determining the tonnage and the dimensions of the canals for heavy traffic in the entire system of a region, extending even into the territory of several States, all the parts of which communicate with each other.

I ask that this observation be taken into consideration when the conclusions to be adopted by the Section are drawn up.

The Chairman. — Mr. Valentini has the floor.

Mr. Valentini (in French). — I find that the General Reporter could not better sum up the opinions of the different reporters, but let me be allowed to mention a few points to be desired in the conclusions which we are to adopt. First of all, it should be a question of putting these in a simpler form. As stated, the question is divided under three heads, and these should also be separated in the conclusions, viz :

- 1) Dimensions to be assigned to the canals;
- 2) Principles of operating;
- 3) Arrangements for the locks.

Then too, as it is generally admitted that the construction of main line canals can be successful only where there is a great traffic and where the movement shows that an intense traffic can be anticipated, there is reason to lay down courageously this idea, that a main line canal can only give good results in positions where the conditions allow the development of a heavy traffic to be foreseen.

Finally, canals should be made with dimensions proportioned to the largest boats which will be drawn to the navigable highway but, naturally, without entering into special conditions which may vary from one country to another or even from region to another.

The conclusions should be put in a simple and condensed form, in accordance with the above order of ideas.

I should like also to have brought out the full extent of the part played in the operating of canals by systematizing the ports and coordinating them with the railways and by the organization of a good traction service.

The Chairman. — Mr. Germelmann has the floor.

Mr. Germelmann (in German). — Gentlemen, I ought to mention that I was inspired by the conditions which exist in Germany, in preparing the report, which I laid before the Congress, on the subject of the dimensions of canals, the principles of operating them and the arrangement of their locks. In Germany, the demands of traffic are met in a way which is essentially different from that in use, in other countries. Our railways belong to the State and their service must be organized not only for receipts but also for the general good of the whole country. Hence there is no competition of canals and rivers with the railways in Germany; rather do the navigable highways come to the assistance of the railways, relieve them and take upon themselves the transportation of coal, ore, stone, etc...

At the present time, the improvement of our system of navigable highways is going on in Germany, and for this purpose researches have been undertaken to determine how canals should be shaped and what should be their dimensions and dispositions.

This result has been reached : that the most appropriate canals were those on which barges of 600 tonnes (= 660 tons) (1) could circulate. They are canals having a depth of water of about 2^m75, 30 metres wide, about, on the bottom, with locks 67 metres and over in length with a breadth of 9^m60 to 10^m00. This result has been reached by researches made to find out the resistances which oppose the motion of the boats which use the canal, and it has been found that a wet section of approximately 75 square metres in area was the one which gave the lowest cost of transportation. It must be mentioned that, in order to obtain the least amount of the cost

(1) The spelling *tonne* means the metric ton of 2,204.6 pounds avoirdupois, while the spelling *ton* means the American ton of 2,000 pounds.

of transportation, account must be taken not only of the cost of the transportation properly so called, that is : the cost of building the boats and the costs of hauling or towing them, but also of the first cost of the canal with the interest and amortization of the capital invested. After considering all these expenses, it was found that the 600 tonne boat was the most advantageous, and thus the dimensions just given were reached.

Our studies were carried on in a way to determine the most suitable speed for the circulation of trains of boats, and it was found that the rate of motion of 5 kilometres (=3.105 miles) an hour was the most advantageous. If a higher speed reaching 6, 7 or 8 kilometres an hour were adopted, the various resulting expenses increase to such an extent that the advantages obtained are no longer in proportion to the disadvantages caused by the increased speed. It was even found not to be better to take a much slower rate than that of 5 kilometres an hour, for the difference noted for the solution at 3 1/2 kilometres or at 4 1/2 kilometres an hour is very small. The power developed for a train of boats moving at 4 kilometres is not sensibly less than that which would be developed in going at 5 kilometres. As the power to be developed for a train of boats is but a small part of the general charges, this difference becomes zero, so to speak.

By comparing the results of the tests made in Germany with each other, it is seen that the canals should be constructed for a very heavy traffic carried in boats of at least 600 tonnes, and that the trains of boats should move at the rate of 5 kilometres per hour.

It follows, from a study summed up in my report, that when care is taken to regulate the movement of the boats, and that when the ports are so equipped that loading and discharging can take place quickly, the costs of transportation are reduced by more than the half of what they are when the boats are left free to start when it suits them and to move, as they choose, at a more or less rapid gait.

Hence it is essential to have a suitably regulated service of navigation and to have available in the ports an equipment of the highest order.

The General Reporter seems, to have drawn attention to these points in his final conclusions. I am very much obliged to him

for this, but I must say that the conditions are sometimes so different from one country to another that the same conclusions cannot be adopted at all times. Perhaps it would be well to point out special cases in these conclusions; perhaps, however, it would be well, on the contrary, to keep to generalities which would be the same in all countries.

I have tried to condense these conclusions to such terms that they can refer to all countries in general; I have given to them the following form :

1) *It is desirable to adopt for canals, in all countries, typical dimensions which will allow freight to be moved without transshipment.*

2) *Well equipped ports and suitable transshipping plants, together with the quick circulation of boats, and canals and boats conforming to each other, contribute to economy of transportation.*

3) *The question of knowing whether navigation tolls should be collected on canals, or whether, in addition to the cost of maintenance of navigable highways, the interest on and the amortization of the capital invested should also be borne by the State, depends upon the political conditions of the country.*

4) *It is desirable, for the traffic of canals, to resort to trains of towed boats and to self-propelling vessels. If the traffic be very heavy, attention should be paid to a regulated movement of the boats in order to increase the efficiency of the canal.*

5. *Where the traffic is heavy, it would be well to operate the locks mechanically. The entrance and exit of the boats, particularly, should be facilitated.*

The Chairman. — Mr. Bourgougnon has the floor.

Mr. Bourgougnon (in French). — It would be well to announce, at the head of the conclusions of the general report, that, in countries which are rather smooth and sufficiently supplied with water, that is to say: in the richest and the most thickly settled parts of the world, it is possible in practice to build canals having such dimensions that freight can be carried on them at lower rates than by rail.

These dimensions vary according to circumstances. Hence it is

that, in France, a canal suited to the circulation of boats of 300 tonnes or, more correctly, to trains of 300-tonne boats (the Northern Canal) is under construction at the very same time that another canal intended for much larger boats (the canal from Marseilles to the Rhone) is in building.

Consequently the conclusions of the general report might be modified.

Again, it would be well to change conclusion 6 which merely notes that the policy of Governments, in the matter of canals, varies from one country to another. It were necessary to say what their policy should be: to build canals able to lower the cost of transportation and this at the cost of incorporated bodies (the State, Provinces, Municipalities, Chambers of Commerce, etc...)

There is one essential reason of a sort to make corporate bodies accept this burden : it is the necessity of having, parallel with the always monopolized railways, a line of transportation open to free competition on which the cost of carriage stands in the neighborhood of the net cost, by virtue of a well known economic phenomenon.

In order that this phenomenon may appear, the intervention of any monopoly must be avoided in so far as possible, whence the propriety of admitting no monopolized installations, even the most useful of them, such as those which regard hauling, except with the utmost prudence (conclusion 8).

The Chairman. — Professor Engels has the floor.

Professor Engels (in German). — Gentlemen, Allow me to say a word from the technical point of view of the question before us. I should like to refer to what Mr. Germelmann said a while ago and to what is contained in his report. I should like to mention that already, 16 years ago, I made some tests, on a small scale, *of the influence which the shape and area of the right section of a canal* had on the resistance to traction, and that Mr. Flamm has already made the results of these tests known in a report laid before the Congress of Brussels in 1898. It is essential to show that these tests, as well as tests which I made on the same subject 10 years later, led, as a rule, to the same results as those mentioned

in Mr. Germelmann's report and showed the superiority of *the profile having a parabolic shape*, with a minimum width of water surface, over the others.

I shall take the liberty of completing Mr. Germelmann's interesting report by adding, that this important fact is due to this circumstance that, while the boat is in motion, the level of the water surface and the boat are both lowered and that the greater the amount of this lowering the more the area of the remaining section is reduced. This being so, we then showed by our tests that the lowering of the water surface measured vertically only varied very little, and under these conditions the least diminution of cross section is produced when the width at the water surface is smallest.

I shall mention still another important fact. I saw in Mr. Pouzirevsky's report that operating by tugs required, in his opinion, a larger right section than operating by power on the banks, for the reason that operating by tugs damaged the bottom and side slopes of a canal far more than when the traction is performed from the sides. It is well to remark in regard to this view, that the action of the water on the side of a canal depends almost exclusively upon the speed and the form of the boat. Hence it seems to me that any consideration concerning the protection of the banks should be set aside in this question, in which it is only the injury to the bottom of the canal which plays any important part.

The Chairman. — Mr. Flamm has the floor.

Mr. Flamm (in German). — *As a boat builder*, I must take a stand in the question before us. I consider that, technically, economically and from the point of view of the conformation of canals, it would be advantageous to consult boat builders, more than it has been the habit to do up to now, when it is a question of determining the dimensions for a navigable highway. It is evident that it can never be other than advantageous for all parties concerned to have boat builders take part in the discussions which arise from the domain of hydraulic works and to put their knowledge under contribution. Trials made in Germany have shown that it was wholly possible to make a better use of the

depth even when propellers are employed, seeing that the water driven back by the screws only attacks the bottom when the rudder is placed in the zone of the liquid forced back. This trouble can be much reduced and even avoided altogether by adopting two propeller wheels or two rudders or other similar arrangement.

As President of the "*Zentral Verein für deutsche Binnenschifffahrt*" (Central Union for German Inland Navigation), I must declare, in conformity with the decisions of this Association, that a monopoly of traffic on the highways of inland navigation, be it a monopoly exercised by the care of the State or by private parties, is not justified and should be avoided.

The modifications to be made in the conclusions submitted by the General Reporter were prepared by the German group of the Members of the Congress during our crossing, and Mr. Germelmann made them known. Aside from these conclusions, I move that naval constructors be called on in the future more than in the past to give their opinions in questions relating to what is to be done in regard to canals and to hydraulic works in general.

The Chairman. — Professor Merczyng has the floor.

Professor Merczyng (in French). — I find, Gentlemen, one point in the conclusions of the General Reporter which interests me particularly : it is the question of mechanical traction. Approving the conclusion relating to this point, and according to which the mechanical traction of boats is to be desired for canals of heavy traffic, I consider that the moment is come to give to constructors and to the respective Governments more precise data on this subject and to indicate the means of traction which can be best admitted on canals under the various conditions of traffic.

This question has not been studied in detail in the reports laid before the present Congress, so I move that it be put down on the programme of the next Congress as it has been already on that of the Congress of Saint-Petersburg. Russia is particularly interested in its solution. There is now under examination in that country a project for traction by means of steam locomotives, of which the system has been proposed by private initiative.

It would be very interesting to have a general statement of the condition of the question in different countries.

The Chairman. — M. Vanderlinden has the floor.

Mr. Vanderlinden (in French). — I had no intention of saying anything, at least in so far as the question of our programme now under discussion is concerned.

As a sequence to the speech of Mr. Germelmann, I think that I should call the attention of the Section to an inconsequence between the statements as presented by certain reporters and their conclusions.

For example, every one has devoted himself to giving the greatest possible efficiency to canals, and justly so, because the expenses inherent to a canal are very great.

It is easy to understand that this point of view should be taken : that instruments which have cost large sums should be made as efficient as possible.

In this order of ideas, it is said justly : that transportation should be organized by means of trains, that locks should be worked mechanically, so as to facilitate the entrance and exit of boats, that nothing should be neglected to obtain an intense traffic on canals. This is perfectly correct, therefore I agree fully with this view.

Now, if there be any way of increasing the efficiency of a canal, it is certainly by letting the boats travel at high speed. Mr. Germelmann, if I have understood him aright, said that the speed in Prussia is limited to 5 kilometres. He finds that a speed of 6 to 7 kilometres is excessive.

So far as I am concerned, I trust that the Section will not adopt that view. A reduced speed is often imposed with a view to protecting the banks against the lapping of the waves raised by the passage of the boats. In order to assure to these latter a higher speed while in motion, nothing more is required than to consolidate the banks.

I shall recall to your minds, Gentlemen, that the following resolution was adopted on this point by the Congress of Navigation held at Brussels in 1898:

"The Congress considers that the banks of maritime canals devoted to ocean navigation at high speed as well as to a large inland traffic should be so thoroughly protected as to allow the

"boats to reach the maximum speed which the right section of the canal will permit."

It should also be remarked, Gentlemen, that there is in this maximum speed nothing of which to be afraid.

I had the honor of pointing out, at the Congress of Paris in 1892, the result of a few experiments in navigation which I had made and from which it follows that: when the immersed part of the boat bears to the area of the right section of the canal the proportion of 1 to 8, the most that can be done is to move at a speed of 10 to 12 kilometres. I give these figures as I remember them.

I consider, for my part, that the banks of any canal should be so solidified that boats can there take the maximum speed which the cross section of the canal, as compared with of the immersed part of the boat, will allow.

The Chairman. — Has any one anything further to say? Mr. Vander Vin has the floor.

Mr. Vander Vin (in French). — I certainly do not rise in order to dispute what Mr. Vanderlinden says. If I had asked for the floor in this connection, it would have been to second him. The question which he has brought to the attention of the Congress is very interesting and very important, and the Congress would do well if it placed the study which he has mentioned on the order of business of a near meeting.

My object is to bring up for an instant to you, Gentlemen, the general question of the dimensions of canals for heavy inland traffic.

The heart of the question, the essential consideration which rises above all others, is that of the necessities which must be met in order that the navigable highway may hold its own against the railway in the case of freight which does not demand quick transportation, the only class of freight for which the navigable highway is intended.

Mr. Bourgougnon has already touched upon this point in his speech, but in rather summary a way. I should like to say something more about it.

It is not exact to compare a navigable highway with a road. Their uses, their objects are not the same. Every one takes the road; one cannot leave home without using it; it penetrates every where; it is used for all kinds of purposes; go where one may, there is the road. The navigable highway, like the railway, is intended for important freights; it is not even used merely for very important freights as is the case of the railway. The comparison arises between the railway and the waterway, the struggle exists between them. If it were demonstrated that the cost of carrying freight by water was heavier than the cost by rail, the construction of canals would be incomprehensible; and all the more so as the railway has real advantages in speed, distribution and penetration.

But, is this the case?

I do not hesitate to answer negatively. People were able to believe that the railway had, after all, an advantage over the canal, as stated by some remarkable works and especially by the report of Messrs. Colson and Marlio made to the Railway Congress at Berne in 1910. But this appearance was the result of comparing poor canals with good railways.

The interest which is inherent in the possession of large ships is manifest also for inland vessels.

For the sea, free competition is an incitement toward the building of large ships and it encounters no hindrance other than that of the dispositions of ports. A competition is set up in this way between ports, and it forces their authorities to give to navigation the satisfactions which it demands.

There is on a given inland navigation line no freely established competition between boats of different tonnage, because the gauge of the line limits the size of the boats. So the interest which is inherent in the increase of the capacity of the boat, in the correlative disposition of the navigable line, in that of its ports, in the organization or improvement of exploitation does not appear so evidently. All the same, competition in the transportation of freight between the shipping point and the receiving point does exist; but it appears between the navigable highway and the railway.

It was assumed, for too long a time, that the initial advantage of the navigable highway lasted, no matter what were its

construction and equipment. Comoy, in 1849, and Krantz, in 1872, were right in their conclusions that this advantage was real even for navigable highways of small size. Krantz's conclusions were legitimate in 1872 when he considered the boat of 300 tonnes. They are no longer so to-day. The railway has been powerfully equipped and organized since then; its rolling stock has been improved and its capacity has been largely increased. Instead of 40-tonne locomotives and cars of five to ten tonnes, there are now very powerful locomotives of 100 tonnes and cars of fifty tonnes. The stations have been enlarged, equipped and perfected. The whole question of operating has been studied, and organized down to its most minute details. The 300-tonne canal still remains, on the contrary, the same tool for transportation that it was forty years ago. It is not astonishing, therefore, that the cost of carriage on the small-sized navigable highway should lose its advantage over the cost of transportation by rail, especially if account be taken, in this comparison, of the important advances granted to the first in the form of real subventions; the amortization of the cost of construction and the cost of operating and maintenance not being paid for by the price of towing.

It is seen, on the contrary, that the canal, even with a rudimentary and unorganized exploitation, does surpass the railway to a large degree just so soon as its gauge is large and especially if the distance travelled be long.

One of the Presidents of our Permanent Association of Congresses of Navigation, Mr. Dufourny, Inspector General of the Ponts et Chaussées of Belgium, has brought all this out very clearly in a very recent and decidedly interesting article (1).

Colonel Hodges, in his report on the dimensions to be assigned to canals of heavy traffic, shows the successive changes made in certain navigable highways of the United-States, especially on the Sault Sainte-Marie and the Erie canals, which allowed these lines not only to preserve, but also to increase their traffic enormously. Colonel Townsend, on the contrary (2), has demon-

(1) Chemins de fer et voies navigables. — *Annales des Travaux Publics de Belgique*. — Part II for 1912.

(2) Utilization of the navigation of large but shallow rivers. Vessels and motors.

strated that the traffic of the port of St. Louis, so admirably situated and so richly endowed with a system of navigable highways, is on the road to ruin because the desired advance has not been made on these lines. And these reporters have showed us, at the same time, that developments of traffic take place after every increase in the dimensions of a given canal.

The phenomenon is general.

In Belgium, it is noted everywhere on the same navigable highway that sensibly better freight rates are to be had on large boats.

I have made on the Belgian navigable highways a summary investigation as to the movement of traffic and I have found a decrease of circulation on the small canals—in spite of the increase of the general traffic on all lines of communication taken together—and a marked increase on the navigable highways which take boats of a greater capacity.

Let me give some figures.

Canals of 300 tonnes or less.

	TONNAGE	
	in 1881	in 1910
	t.	t.
Mons to Condé	489,456	355,218
Pommerœul to Antoing	461,684	297,032
Charleroi to Brussels	491,423	411,429
Bossuyt to Courtrai	105,640	81,057

Canals of 450 to 500 tonnes.

	TONNAGE	
	in 1881	in 1910
	t.	t.
Liège to Maestricht.	443,004	2,170,570
Maestricht to Bois-le-Duc.	665,267	2,544,997
Junction of the Meuse to the Scheldt.	410,670	1,256,895
Ghent to Ostend	194,986	671,694

Lines of large section

	TONNAGE	
	in 1881	in 1910
	t.	t.
Canalized Meuse.	214,383	1,371,727
Canal from Brussels to the Rupel . .	1,044,995	1,756,125
Canal from Ghent to Terneuzen (inland navigation only)	579,069	1,132,847
Rupel.	1,102,052	2,346,646
Lower Scheldt	661,042	2,878,810

Hence the character of the phenomenon is sufficiently constant to allow setting aside the special economic factors which may have affected the movement of freight on one or another line in particular.

Here, Gentlemen, is a fact which would show by itself the advantage which the transportation industry finds in the use of large boats: boats of the Rhenish type, which are now being built and which are intended to circulate on the canal from Brussels to the Rupel. This canal is under transformation and the boats are so constructed that they can be lengthened so soon as all the new locks are brought into use.

The Chairman calls Mr. Vander Vin's attention to the fact that the time allowed to each speaker by the by-laws is exhausted.

Mr. Vander Vin (in French). — I am unable, therefore, Gentlemen, to take up the question of arrangement of the locks, the ports and of operating. I limit myself to pointing out, in conformity with the general ideas which I have opened up before you, that it becomes necessary so to build and equip the locks that they will insure a quick and safe passage for the boats (dimensions sufficient to receive a towboat and two barges tandem so as to avoid any change in the train; a largely calculated right section; a good depth of water under the boats; mechanical means for manœuvring the gates and for facilitating the entrance and exit of boats), that it is necessary to equip the ports in order to insure

a rapid handling of freight and to organize the operating department systematically as is done on railways.

It is only at this price that navigable highways will fulfill their part and serve the traffic offered without the competition of the railways being able to touch them.

I sum up, Gentlemen, what I have said by submitting to you the following conclusion:

The navigable highway and its navigating plant should be improved, as have been the railway and its rolling stock, in order that each may best serve, in the interest of all, the particular traffic for which it is especially intended.

The Chairman. — Professor Engels has the floor.

Professor Engels (in German) Gentlemen, I must take exception to the statement which Mr. Vanderlinden made a while ago. The many tests which we have made on models have shown on the one side that it was impossible to increase sensibly on canals the speed of circulation beyond 5 kilometres an hour, and, on the other side, than an increase beyond the figure of 5 for the ratio between the section of the canal and the maximum immersed section of the boats was not justifiable from the economic point of view. The increase of speed would increase very sensibly the resistance to traction, and, furthermore, only a very great increase of the section of the canal would lead to an appreciable decrease in the resistance of the boats to traction. But the pecuniary sacrifices which would be involved in the realisation of the first of the conditions would be in no wise made up by lessened resistance which would be obtained.

I move, in so far as the question in general is concerned, that a sub-Committee be appointed to prepare the final wording of the conclusions to be laid before the Congress.

The Chairman. — Mr. Smrcek has the floor.

Mr. Smrcek (in German). — Gentlemen; If I ask for the floor, it is only to make a short remark, and to say that the Austrian

engineers agree with the ideas set forth by my colleague, Mr. Engels. If it be desired in Austria to undertake the construction of a canal in parts of the country where the conditions offered by the ground are often difficult, we are obliged to be satisfied with the adoption of rather restricted cross dimensions, or else give up entirely any enterprise of the sort by reason of the enormous cost to which the work would give rise if carried out under other conditions.

The object which we seek to attain is not so much great speed as it is to have at our disposal a cheap means of carrying bulky freight; this is the first condition to be fulfilled, it is one of economic order and I should be glad, from Austria's standpoint, if the conclusions to be adopted by the Section were so worded as to bring out this idea.

The Chairman. — Has the General Reporter any objection to offer?

Mr. Noble (in English). — Mr. Chairman and Gentlemen; It is my misfortune not to understand either French or German, consequently I have been unable to take in what has been said and therefore I cannot reply to any remarks which may have been made during the course of the discussion.

Professor de Tlmonoff (in French). — Professor Engels has expressed the opinion, in closing his remarks, that a sub-committee should be appointed to discuss and draw up the conclusions for the second question.

The Chairman. — If the meeting do not object, this sub-committee will be composed of the General Reporter, the reporters and the members who have taken part in the discussion. It will meet here at 1.30 p. m.

The proposition was adopted.

The Chairman (in English). — Gentlemen; It was agreed that you should be made acquainted to-day with the conclusions for the **first question**, which have been drawn up by the sub-Com-

mittee appointed for that purpose at our session of May 23. I shall ask Professor de Timonoff to be so kind as to read them.

Professor de Timonoff read the conclusions successively in French, German and English, as follows:

1. *Absence of any Exclusive Method.* — The navigability of rivers having but one current can be improved, as it has been stated many times at the Navigation Congresses, by various methods, such as: Regulation of the bed by permanent works; regulation of the bed by mechanical dredging; increase of depth by an additional water supply furnished by storage reservoirs; canalization of the bed; combined action of the two or more of above processes; construction of a lateral canal. The use of one of these methods rather than another depends upon the special circumstances of each particular case. Among these circumstances, the following are of prime importance: The nature of the river and of its navigation; the existence of objects of improvement other than that of navigability (more especially agricultural, power or sanitary purposes; protection of the banks in the interest of towns, protection against inundations), the degree of the navigability required, the importance of the expected traffic, the resulting cost of transportation, including interest on the cost of improvement, maintenance charges and the cost of carriage, money and time available to insure, for the boating industry on the line in question, the conditions of navigability sought, etc.

2. *The impossibility of establishing, at the present time, fixed rules determining a priori the method which has to be preferred in any given case.*

— While stating that the different methods used for improvement of river navigability have given satisfactory results and reached their purposes under the special conditions in which they have been applied, the Congress finds, that it would be premature to try to establish at the present time fixed rules determining a priori, the method to be preferred in any given case, inasmuch as the classification of rivers from the standpoint of their nature and of their navigation is yet to be accomplished.

3. *Necessities for Studies.* — If there be no general method for improving the navigability of rivers which is applicable to all rivers, and if the selection to be made be always governed by circumstances and remain a question of kind, each process can be perfected and made more suitable for rivers of a certain regimen. This makes it desirable:

“(a) That scientifically organized special studies be undertaken, by sundry nations, on rivers with different regimens in order to

observe the degree of navigability which it is possible to attain by the applications of various methods of improvement and to determine the factors which govern the cost of the corresponding works;

“(b) That hydrotechnic laboratories intended for the study, on small scale models, of the life of rivers become of more and more extended use and that they be supplied with the means necessary to experiment with the various processes for improving the navigability of rivers and, in so far as possible, in connection with the studies and works carried out on the rivers themselves;

“(c) That the resolution of the Sixth Congress of Inland Navigation, voted at The Hague in 1894, be carried into effect, this resolution calling for taking up, in connection with rivers having but one current, the study of a short, clear formulary, which shall be sufficiently complete and include the information necessary to define the characteristics of every river studied, from the double point of view of its regimen and its navigation;

“(d) That the improvement of the navigability of rivers having but one current, completed by those of the laboratory experiments and of the formulary, be kept on the order of business of the next Congress of Navigation.”

The Chairman. — Gentlemen; You have heard the conclusions of the sub-Committee as read by Professor de Timonoff; does any one object?

Mr. Vanderlinden has the floor.

Mr. Vanderlinden (in French). — I have a few observations to make about the procedure followed in presenting these conclusions. I have also some to offer as to their matter.

First, the procedure. Day before yesterday, after our first session, there was an exchange of views between the various members of the sub-Commission charged to prepare the wording of the conclusions to be laid before you.

There was no real proposition, for I have here what the Secretary wrote at the end of the meeting : Reunion on Saturday, at 9 A. M., to revise the conclusions.

It may be asked : “Why were you not there when the sub-Committee met day before yesterday afternoon?” My answer is this.

At that very hour, I was a member of a sub-Committee of the 2d Section where I was kept until 5.30.

This morning, I was on hand at 9 o'clock. We had a half-hour in which to revise the conclusions; unfortunately nothing was done. The sub-Committee held no meeting; what took place was merely a little talk between members.

At 9.30, when the first section was again taking up its work, I asked the Chairman to tell me when the discussion of the conclusions of the first question would begin.

He answered : "When the work of the revising Committee should be finished."

I waited in vain for a summons, and now, at this very moment, without the sub-Committee having been called together again, conclusions are read which were finally prepared by the sole authority of Mr. de Timonoff.

I come now to the text of the conclusions as presented by Mr. de Timonoff.

The first, entitled: "absence of any general method" is but a long and tiresome enumeration to support a proposition which no one can dispute. Every engineer, who has some little knowledge of the improvement of rivers, knows very well that there is no general method to meet the case. It is almost an axiom. Consequently, this first proposition seems to me to be useless. I propose that it be dropped.

The second conclusion is worded as follows :

Impossibility of laying down at once any fixed rules to indicate, a priori, the method which should be preferred for a given case.

The studies on the subject of the improvement of rivers made up to now and especially the remarkable reports which have been laid before this Congress, allow, in my opinion, the method which should be preferred in given cases to be pointed out pretty clearly. This is what our Congress should bring out and that is why I propose to the Section to vote the conclusions which I have the honor to offer.

The very object of these conclusions is to show when we must:

1° regulate the river;

2° make up for deficiencies in regulation by means of storage reservoirs;

3° canalize;

4° resort to dredging;

5° resort to the lateral canal.

I have no observation to make in regard to Mr. de Timonoff's third conclusion.

Major Oakes (in English). — Mr. Chairman, I think that I should mention to you that the General Reporter, Colonel Newcomer, whom I saw this morning, has the idea that the conclusions of the first question were not to be presented at this session. As he is not here, it seems to me that the discussion of these conclusions should be put off, or, at least, that we should refrain from taking any decision in regard to them.

The Chairman. — Colonel Newcomer was here a little while ago!

Major Oakes. — I think, all the same, that the General Reporter should be here to make his views known.

The Chairman. — It had been understood that the conclusions would be presented during this session; this is what has been done.

Mr. de Timonoff has the floor.

Mr. de Timonoff (in French). — I am obliged to take the part of the honorable Chairman, Mr. Bogart, who might be considered, according to Mr. Vanderlinden, to have been lacking to the obligations of proper procedure. I say decidedly that the procedure has been excellent and in conformity at all points with the desires of the Section itself. If Mr. Vanderlinden be not of this opinion, it is because he took no part in the labors of the sub-Committee, although he had been warned that it was going to meet. He considered it proper to go away in order to share in the labors of another section. Our sub-Committee did its work without him and now Mr. Vanderlinden would like to make us begin again all the work which has been done because the conclusions of the sub-Committee are not in accord with what he desires. No

demand of this sort has ever been made at an international Congress. If the work of a sub-Committee, at the moment when it has come to an end and given a result accepted by all the members present, is to be begun over again because a member did not wish or was not able to be present at the meeting of the sub-Committee, the holding of any more Congresses must be given up in future.

Their action will be or can be paralyzed by a single one of their members. If you follow the path lauded by Mr. Vanderlinden, you will create a precedent which will have hereafter the deplorable consequences which I point out to you.

As to the procedure, it was in few words as follows:

The Section, at its session of May 23, had directed a sub-Committee to draw up a set of conclusions on the first question, this sub-Committee being composed of reporters and members who had taken part in the discussion.

This sub-Committee was called together by the Chairman of the Section, Mr. Bogart, immediately after the adjournment of the session of the Section. The sub-Committee, after an exchange of views, agreed upon a draft of conclusions which included three paragraphs drawn up in French, during the meeting of the sub-Committee, in conformity with the views of the members who had spoken. In order to make the conclusions adopted as exact as possible, and to arrange for translating these conclusions into English and German, the sub-Committee asked me to take charge of this double work and decided to meet again on May 25, at 9 o'clock in the morning to read, in the three languages, the draft of the conclusions. This second meeting of the sub-Committee was held this very morning at 9 o'clock. The three texts were read by the members of the sub-Committee and were corrected in conformity to their indications. The corrections of the German text were made, amongst others, by Mr. Germelmann, and those of the English wording by General Bixby. I compared the three texts carefully. The Chairman of the sub-Committee, Mr. Bogart, announced that these texts would be submitted to the Section this very day.

These texts have now been submitted and it is for the Section to decide.

The Chairman. — Mr. Sanjust di Teulada has the floor.

Mr. Sanjust di Teulada (in French). — We were asked to meet this morning. I believed that the various propositions before us were to be discussed. We arrived at 9 o'clock, but the sub-Committee was not called to order. I regret, therefore that I must confirm what Mr. Vanderlinden has said. I understand very well the reasons which Mr. de Timonoff pleads in order to go on, seeing that it is a question of an international Congress of which the time is very limited for reaching its conclusions. But I repeat that the sub-Committee did not meet this morning.

The Chairman. — Mr. Bourgougnon has the floor.

Mr. Bourgougnon (in French). — In order that there may be no misunderstanding, the sub-Committee might be called together once more. It seems that every difficulty would disappear if there were a real meeting which the members of the sub-Committee could attend.

I propose therefore a new meeting of the sub-Committee.

The Chairman (in English). — When the meeting was held day before yesterday by the sub-Committee, all that remained to be done at the end of the session, so far as I can recall, was to sum up what had been said. Mr. de Timonoff, who did this work, considers that he acted in accordance with the instructions of the sub-Committee, but the Section is, evidently, free to decide as it pleases.

M. Vanderlinden (in French). — I regret being obliged to call attention to a few inaccuracies in what Mr. de Timonoff last said.

First, contrary to what Mr. de Timonoff states, I was not notified that the sub-Committee was going to meet day before yesterday afternoon.

Then, I stand by all that I said a while ago in regard to the meeting of the sub-Committee which was to be held at 9 o'clock. Besides, Mr. Sanjust di Teulada has just confirmed the fact that this sub-Committee held no meeting this morning. The proposi-

tions drawn up *provisionnally* the second evening before, which, by the terms of decisions reached by the sub-Committee, were to be revised, *were neither revised nor even read in sub-Committee.*

I shall add that, between 9 o'clock and 9.30 this morning, I asked Mr. Bogart, our Chairman, and Mr. de Timonoff himself several times when the sub-Committee was going to begin its work of revision. Nothing further came of my question.

In combatting the first two conclusions of the sub-Committee a moment ago, I merely made use of a right which every member of the Congress holds. My attitude is, therefore, in no way contrary to the jurisprudence of our Congresses.

Mr. Sanjust di Teulada (in French). — In order to settle the question, Messrs. de Timonoff and Vanderlinden might hold a meeting with the Chairman, for the purpose of presenting definite conclusions during this afternoon's session. I think that this solution would be accepted without discussion.

Mr. Vander Vin (in French). — The situation is this : the sub-Committee met, but it was not complete. Is it admissible that the conclusions are to be accepted all the same? I propose that matters be set right by reassembling the sub-Committee.

The Chairman (in English). — The Section will please decide whether the conclusions offered by Mr. de Timonoff may be considered or whether the rest of the discussion shall be postponed to a later session. In other words, ought the wording of the conclusions as proposed to form the object of a new meeting of the sub-Committee or not?

When this question was put to the vote, there were twenty four votes cast in its favor and twenty four votes against.

The Chairman. — There are as many ayes as noes; a new vote will be taken.

The new ballot showed twenty-one ayes to twenty-seven noes.

The Chairman (in English). — So it is decided that the sub-Committee is not to reassemble. This being so, I shall call for a

vote as to whether the conclusions to the **first question**, as formulated by Professor de Timonoff, be adopted or not.

The votes were cast giving twenty-nine ayes and nineteen noes.

The Chairman. — The conclusions are adopted.

Gentlemen; the sub-Committee appointed to draw up the conclusions to the **second question** and composed of the General Reporter, the authors of reports and the members who have taken part in the discussion of the subject, will meet in this hall at 1.30 this afternoon.

The session adjourned at 12.30 p. m.

FIRST SECTION (Inland Navigation)

THIRD SESSION

Saturday afternoon, May 25, 1912

Mr. John BOGART in the chair

The meeting was called to order at 2.30.

The Chairman (in English). — Gentlemen, we shall now go on with our work.

First of an, let me have read to you the conclusions handed in by the sub-Committee appointed this morning by the chair to prepare a draft of conclusions on the subject of the **2d question**, which relates **to the size of canals and to the principles of operating them.**

These conclusions are worded thus :

1. **Standard dimensions for interconnecting canals, permitting interchange of traffic without trans-shipment, are desirable.**
2. **Practical harbor and trans-shipment facilities and the rapid circulation of the means of transport are as important for the economy of transportation as are fixed dimensions of canals and boats.**
3. **The waterway and its boats should receive progressively the improvement needed in order to continue to serve the traffic which it develops.**
4. **It is desirable in order to develop the traffic on the canals to employ trains of boats, towed by tugs or self-propelling boats. If the traffic becomes very important, special attention should be paid to regulating the movement of the boats.**
5. **For an important traffic, it is desirable to operate the locks with mechanical appliances. Special attention should be paid to facilitating the entrance and the exit of boats.**

A vote having been taken on these conclusions they were adopted by the Section.

The Chairman. — We will now take up the examination of the **third question** of our order of business, stated as follows :

Intermediate and terminal ports. Best methods for combining, facilitating and harmonizing the transfer of freight between waterways and railways.

This question has been studied in several reports laid before the Congress by Mr. Eisenlohr (Germany); Messrs. Tomkins and Huebner (United States); Mr. Mallet (France) and Mr. Tsionglinsky (Russia).

Professor Emory R. Johnson, General Reporter, has the floor.

Professor Johnson (in English). — Mr. President and members of the Congress, before reading the conclusions as formulated at the end of my report, I must recognize that they reflect conditions peculiar to America rather than those which exist in other countries. Only three papers from foreign countries were submitted to the General Reporter; one from France, one from Germany and one from Russia, and these three papers dealt mainly with mechanical or technical questions, whereas the problem as it confronts us, in the United States at least, is more a question of connection and co-ordination of rail and water lines than a problem of technical construction of harbor facilities. I have been led in this order of ideas to the following conclusions :

I. *The problem of combining, facilitating and harmonizing the transfer of freight between waterways and railways is partly administrative or governmental and partly technical or mechanical. The methods to be followed in dealing with questions of administration must depend upon whether the railroads are owned and operated by the government or by corporations.*

In countries having state railroads, the connection and co-ordination of railroads and waterways at ports can be readily accomplished by the co-operation of local and state governments. The necessity for such co-operation is generally recognized; and the requisite distribution between the municipality and the State of financial and administrative burdens is ordinarily made without serious difficulty.

The co-ordination of private railroads with public waterways being generally opposed by the railroad companies, must be, and ought to be, secured by the effective regulation of railroad services by national, state and local governments. The legislative and administrative requirements of the several political authorities should so supplement each other as to make a unified transportation system of the railroads and waterways in each country.

2. *Whether terminal and intermediate ports are developed by private interests or by municipalities, it is essential that each port should be systematically organized for the accomodation of the traffic and the industries to be served. In some instances, this has been brought about by public regulation of ports owned and developed solely by private capital; but experience conclusively shows the need of supplementing public regulation of privately-developed terminals with the municipal ownership and operation of wharves, docks, warehouses, and other harbor facilities for the general use of the public. The number and variety of wharves and other facilities that should be maintained by the state or municipality at any particular port will depend upon the local requirements of the port. Exclusive private ownership of water terminals is indefensible.*

3. *The actual legislative and administrative measures to be taken to co-ordinate railroads and waterways, to unify and systematize port facilities and to provide an efficient harbor administration must vary with different countries :*

In the United States and countries having similar political organization it is necessary :

a) *That the Federal Government, which has authority over interstate commerce and carriers, should require railroad companies, engaged in interstate commerce*

1. *To make physical connections with waterways;*
2. *To exchange traffic with the waterways;*
3. *To issue through bills of lading and quote through rates over combined rail and water routes, and*
4. *To secure to shippers the option of dispatching freight by an all-rail or by a rail-and-water line, when a choice of routes is possible.*

b) *That the several state governments should take Similar action concerning intrastate commerce and railroads, and*

c) *That each state should create in connection with the city government of each port, a harbor department or board, and should authorize the municipality, acting through this department or board, to take such measures as may be necessary to unify and systematize the physical layout of the water terminal, to construct and operate such public quays, wharves, docks, warehouses and other harbor facilities as may be needed, and, generally, to regulate and develop the port.*

4. *In countries which do not have a federal government, the state and local governments should co-operate (each country according to methods that have been found by experience to be wise and effective) to co-ordinate railroads and waterways, to systematize and develop the ports, and to insure their use by the general public without unnecessary restriction or unfair discrimination.*

5. *The physical layout of intermediate and terminal ports and the mechanical appliances best adapted to the handling of traffic must be determined for each port separately and in accordance with its special requirements. Local city and state engineers must apply to the solution of local problems, and adapt to local conditions, the principles of port organization and operation that have been found effective at other ports and in other countries.*

Professor Johnson. — My duties will keep me in Washington next Monday, and I shall not be able, perhaps, to assist in preparing the draft of the conclusions to be submitted to the Section if the matter should only be laid before it in the course of its next session. I desire, therefore, to point out now that, in my opinion, the conclusions which I have prepared may be made more concise, as well as more general and more complete, so as to adapt themselves equally well to the conditions existing in other countries than ours. This will be, I think, the result of the deliberations of the Section.

The Chairman (in English). — Gentlemen, discussion is now in order; the members who desire to take part will please hand in their names to the Secretary of the Section so that I may be able to call upon them in turn to present their observations.

Mr. Harding has the floor.

Mr. Harding (in English). — The general report and the conclusions of Professor Emory R. Johnson have so completely covered the administrative and governmental aspects of the question as well as the harmonizing of the transfer of miscellaneous freight at inland terminals, that there seems to be left only the question of the mechanical combining and facilitating of this transfer. Mr. Thomas Wilkinson, the President of the Upper Mississippi River Improvement Association, than who no one has done more to inaugurate and carry to fruition this great movement, has stated most clearly and forcibly the necessity for a rapid and economical transfer of freight. A terminal for package water-borne freight consists, especially along the inland rivers, of the quay walls, properly designed sheds, car track space, dray areas, each with its shed-covered platforms, and warehouses, with open yards, where goods have to be left long in storage. All of these elements should be so connected or co-ordinated that freight, without any rehandling, can be transferred continuously from the one to the other without any delay.

It appears as though overhead runways, a combination of fixed and movable tracks traversed by trains of tractors and trailer hoists would best fulfil the exacting conditions of handling this class of freight. The necessity for avoiding rehandling, congestion and interference is self evident.

There should be provision for tiering so as to increase the terminal capacity. Not only should there be economy in this handling, but also rapidity. The floor space should be kept as clear as possible for storage and not be reserved for other purposes such as surface or floor movements. The machinery should also be able to hoist and convey separately the different consignments or shipments according to the marks or cross marks.

The advantages of the recent improvements in mechanical transfer over the primitive methods may therefore be summarized.

A reduction in terminal handling reduces costs to at least one-half and makes a similar saving in the time of the ship's detention;

- Increased storage and transferring capacity of terminals;
- Saving in port investment;
- Better service to the shippers and consignees;

Less losses from breakage and damage claims;

Avoidance of labor troubles, and

A better utilization of lands for industrial and manufacturing purposes even though at several thousand feet to the rear of the water front.

The Chairman. — Mr. Schmidt has the floor.

M. Schmidt (in German). — It seems apposite also, in other respects, to resort to fitting up sales offices on board of boats as proposed by Mr. Mallet in his article, so as to interest by this means new centres in the movement of ports and of inland navigation. It would be well also to allow agricultural products to reach centres of consumption by water. This necessity is all the greater as, contrary to what Mr. Tsionglinsky says in his report, the communes are obliged, in most countries to spend large sums every year for their ports, and as it is important to make new centres profit by the advantages which result from the expenditures for public purposes.

As to the extent of ports for inland navigation, it were well to make a distinction between river ports and canal ports and also to differentiate ports which are essentially commercial from those which are rather more industrial, as these latter do not, as a rule, receive many vessels at once.

The Chairman. — Mr. Wilkinson has the floor.

Mr. Wilkinson (in English). — Mr. Chairman and Gentlemen, The subject under discussion this afternoon is one which vitally effects the inland waterways of my Country. I take off my hat to these gentlemen from France, Germany, Italy, Belgium and other countries of the world which have made such magnificent use of the waterways with which Divine Providence has favored them for the transportation of their commerce.

We of this Country have been blessed by the Creator of the world with a magnificent system of inland waterways. We have about twenty-six thousand miles of navigable rivers, and what are they doing? Practically nothing, and why? We have also in this

Country a magnificent system of railways unequalled anywhere in the world. What have they done? They have secured a monopoly of all transportation. We at one time, before the coming in of the railroads, had traffic on our rivers, but the railroads have absorbed that traffic and taken it away from the rivers and will continue to do so until the action that has been recommended by Prof. Johnson in the summary of his report, is incorporated in the law by our general government.

There is no reason in the world why our rivers should not be made to work for us. The Government has expended large sums for the development of our waterways. We have splendid channels on most of our rivers. They have deeper channels than your rivers in Europe, but they are not being used for the reason I have given, but we hope for better days in the future. We hope that the Legislators in our National Congress and in our State Legislatures will give us relief from this dominating railroad monopoly which has driven the traffic from our rivers. When we see that our rivers can be used, we shall want such terminals as those of which Mr. Harding has just spoken.

On the river which I represent, the Upper Mississippi, the oscillation between high and low water is not great, probably, we will say, twenty feet. With such a light oscillation as that, it will be very easy to construct such terminals as Mr. Harding suggests and we hope that by building such terminals it will popularize river traffic. As it is now, we have practically nothing in the way of ports or terminals, which are worthy of the name, on any of our rivers.

There is not installed at present at any river port in this country a single piece of machinery for the handling of heavy freight or the interchange of traffic between railways and waterways.

A Member. — Nor for miscellaneous packages?

M. Wilkinson. — No sir, Whenever they do get the goods, they have to haul the freight up or down big inclines, over rough places, from the railroad freight stations to steamboat landings, where the merchandise is discharged on the waterfront to be

shipped to the destination which it is intended that it should reach. For this reason it is not popular to ship by water and, in nine cases out of ten, shippers are patronizing the railway because of its convenience and are willing to pay the difference in the rate of freight.

If we can have such terminal facilities as Mr. Harding speaks of in his remarks, and coordination and cooperation between railways and waterways, it will popularize our rivers and bring the traffic back to them, and that will come when the rivers are protected by such legislation as we expect to secure from the National Congress and our State Legislatures in the future, so we hope that in a short time we can make a better report of the use of our rivers than we can do today.

There is a vast amount of freight in our country that can be moved economically by water, the same as in your countries. We have heavy tonnage such as iron, lumber, grain and bulky materials of that kind which can be carried by water but are now being carried by rail.

Railways not only have absorbed the river traffic, but they in many cases control both the water fronts and the boats. I have seen it stated that ninety-five per-cent of the water fronts of our country are controlled by railways. As a matter of fact, on our Great Lakes, the Mediterranean Sea of the United States, the railways have complete control of nearly every harbor, and of nearly all the steamers that navigate those Lakes and carry such an immense tonnage, the largest on any inland waterway in the world.

Tell me, gentlemen, how can waterways live under such adverse circumstances and serve the people as the waterways should serve them?

The payments made to the railroad companies of the United States, for the transportation of freight and passengers, amount to more than the receipts of the National Government from the tariff and internal revenue; the taxes collected by the States and Territories; the cities, towns and villages; and the counties, townships and school districts, all combined. In a word, the transportation taxes collected from the people of the United States amount to many millions of dollars more every year than the taxes col-

lected for public purposes by all our governmental organizations from the district school up to the Nation.

Who pays the freight on these cargoes of flour, or potatoes, or meat? Is it the producer? Is it the wholesaler? Is it the retailer? No, it is those who use these materials; the ultimate consumer; the people.

The people are entitled to such reduction of this immense tax as God Almighty intended them to have by the economical use of these water-ways.

Gentlemen, I thank you.

The Chairman. — Mr. J.-F. Coleman has the floor.

M. Coleman (in English). — Mr. Chairman and Gentlemen,

The port of New Orleans, for which I have the honor to be Consulting Engineer, is very much interested in the subject that is under discussion before this Section today. I have looked over the papers that have been presented to the Congress and have read the Conclusions expressed by the Reporter. It had been my own view that it was rather the mechanical than the administrative angle from which this particular question should be approached, at least at the hands of the International Navigation Congress.

The port of New Orleans is both a terminal port and an intermediate port. It is one hundred and twenty miles above the mouth of the Mississippi River and is both the intermediate port for water and railway traffic which reaches New Orleans for transshipment, and it is also a terminal port for railway traffic, for river traffic, and for ocean traffic.

The physical conditions governing the wharves and their construction at New Orleans require that our docks or wharves should be built parallel to and alongside of the banks of the stream, instead of in the shape of piers, such as are familiar to us at most sea ports.

Our City owns and operates these wharves or docks; also a belt railroad which is the means by which the goods shipped from the interior by the railroads may be transferred to vessels over the docks. The question of so co-ordinating the facilities of river

and rail transportation as to render it practical to transfer the freight mechanically from car to ship or from ship to car, seems to resolve itself into a question of proper mechanical devices for such operations and this question is not easy to solve.

However, it is generally a matter of placing cars close to the edge of the docks and wharves and transferring the freight by means of conveyors from docks to vessels, and from the vessels to the docks. When it comes to handling general cargoes of boxes and packages and bales of irregular sizes, it seems to me that the question becomes an intricate one, and one which is going to call for a great deal of earnest study before we can reach a definite conclusion likely to prove satisfactory to all of us. We have, in New Orleans, a flood elevation of approximately twenty feet above low water. The difficulties that we naturally encounter by reason of this elevation render necessary a different class of operations from those which would be satisfactory in such places as New York, for example, where there is a total difference in tide elevation of only some five or six feet. We have found no great difficulty in taking care of our troubles in the transfer of certain classes of freights from car to ship or from ship to car with the telfer, but we have just begun to tackle this problem of mechanical freight handling and I can say, for the information of the gentlemen of the Congress, that New Orleans is a port which is equipped only to a limited extent with such mechanical facilities. We have a movable endless conveyor arrangement which can be adjusted to different elevations or to receive cargoes from the vessels to be delivered to the dock or vice versa. We have some special installations that have already been put into use. We have, at this time, a very remarkable piece of mechanical equipment in the shape of a banana unloading device which is an endless chain conveyor with pockets made of canvass. Bunches of bananas which are from three and one-half to four feet long and which weigh as much as two hundred pounds are placed in these pockets which travel over this endless chain conveyor and which deliver to a location convenient for loading the bananas into railway cars.

We have under consideration and are studying a special type of construction for the handling of cotton—for the storage and delivery of cotton by mechanical apparatus from the ships. We

are studying also the question of machinery for the handling of coffee. We have very little to announce in the way of actual accomplishments, but we have much in prospect and we hope that we shall be able, at the time of the next meeting the International Navigation Congress, to report the construction of something of interest to you.

The Chairman. — Professor Clapp has the floor.

Professor Clapp (in English). — Mr. Chairman and Gentlemen, I want to say a word in qualification of something Professor Johnson stated—that our waterway transportation problem here was administrative rather than technical. I believe that when he made that statement he had reference to the conditions on the Great Lakes and not to those on our rivers and canals. In the case of the rivers and canals we have a pressing technical problem.

When you gentlemen go to Pittsburg and see the Ohio River, or if you go farther west and see the Mississippi River, you will look long to find a single installation for transshipping goods direct between rail and water carriers. If you wish to ship miscellaneous freight down the Ohio from Pittsburg you must dray it down a hilly levee to a wharf boat, which is a floating freight shed. The distance of this wharf boat from the top of the steep levee depends upon the height of water. If the goods have come by rail they must be brought from the local freight-receiving station of the railroad to the wharf boat. From the wharf boat the goods are rolled or carried by hand to the boat. Suppose they are being shipped to St. Louis. How will the shipment be handled at the St. Louis terminal of the boat line?

You know how it would be done abroad. They would simply bring the boat or barge alongside a quay on the edge of which would be running an electric crane, which would take the goods out of the boat and deposit them in a quay-shed. In the shed they would be sorted and, if destined for local delivery, would be drayed to destination. If destined inland, they would be put into a railroad car running alongside the back platform of the shed. This is the sort of transshipment which results in charges that freight can bear without being compelled to desert the waterway.

But in St. Louis the goods are thrown off the boat into a wharf boat or even upon the levee, and covered with a tarpaulin. If they are destined to go farther by railroad they are drayed for a mile or more to a freight-receiving station of the railroad, which unwillingly accepts them and charges them the high local rate because they have committed the sin of coming by water as far as St. Louis. If they had come by another railroad as far as St. Louis there would have been a through rate charged for the entire shipment from Pittsburg to destination, far lower than the rate charged from Pittsburg to St. Louis plus the rate from St. Louis to destination.

The first thing that we must do is to get installations that will permit of a cheap exchange between the river and the rail carrier. The second thing is to induce the railroads to co-operate with the waterways and pro-rate with the water carrier as it does with other railroads.

This is the crux of the whole matter. It is foolish to talk of voluntary co-operation between rivers and railroads. The railroads do not care to be condemned to the short haul to the nearest river port, for it is on the long haul that they make their money. They insist, in this country, on being allowed to defend themselves against their natural enemies. And our courts allow them so to defend themselves.

It has been decided that the long and short haul clause of the Interstate Commerce Act, designed to prevent the railroads from discriminating in their rates under substantially similar conditions, does not apply where water competition is present. This establishes the right of the railroads to defend themselves in water competition.

We can never have much river traffic,—never enough to support barge and steamer lines until the railroads begin feeding and distributing for the river barges. A great seaport is before everything else a transshipment point for the exports and imports of a wide hinterland. Railroads collect and distribute cargoes of lines which find it worth their while to come there. Nothing but the same co-operation on the part of the railroads will make a great river port. Where railroads are in the hands of the state, it can afford to curtail its revenues by contenting itself with the short

hauls which it gets when its rates are designed to let it feed and distribute for the river traffic. The general prosperity induced by cheaper transportation is a satisfactory consolation for smaller railroad revenues. But no one can expect privately owned railroads to act in this altruistic manner.

Just one point more. I don't believe that we should say so much about the impracticability of transporting valuable articles by inland waterways. That has not been my experience. In Germany I found very much high class freight going by river. Glass is shipped from the factories near Düsseldorf to Rotterdam by water and not by rail. In addition to lower rates, the glass gets a smooth joltless journey. The railroads take the glass to Düsseldorf, where it is transhipped to Rhine barges or steamers. The transshipment charges, because of the installation in Düsseldorf, are so small that the total rail and water cost of transportation from factory to Rotterdam is less than the direct rail rate.

You will find the same thing on the Elbe. How do we import our Pilsner and Münchener Beer? Pilsner Beer is brought by the Austrian railroads to Laube-Tetschen, near the Saxon border, and there it is put into bonded barges with ice machines and cooling pipes on board. At Riesa, far down the Elbe, Münchener Beer, brought by the Bavarian and Saxon railroads is taken on. There are two such barge trains per week operated by the United Elbe Navigation Company from Laube-Tetschen to Hamburg, where the beer is put on steamers and brought over here to supply thirsty Americans.

There are certain perishable articles, such as fruit and corpses, which require more rapid transportation than they can get if they go by water. In the case of diamonds and such exceedingly valuable articles, the insurance rate by water, expressed in percentage of the value of the goods, makes water transportation unprofitable. But these two classes of goods are the great exception.

We must get ready to transport package freight as well as bulk commodities by water. As a matter of fact the water carrier offers in rates more inducement for high class than for low class merchandise. The railroad charges what the traffic will bear; that is, valuable freight is made to pay more because it can, and not because it costs more to transport it. Bulk freight is often carried

by rail at or below the cost of transportation. Under the free competition prevailing in river transportation, all rates, whether for bulk freight or high class merchandise, are close to the actual cost of carriage. Therefore the margin between the rail and water rate is greater in the case of high class than in the case of low class freight. It is my belief, and I am not alone in this belief, that the waterways of Germany transport a larger proportion of the high class valuable merchandise moved than it does of the low class cheap freights.

The Chairman (in English). — Professor Clapp has endeavored to establish a comparison between the conditions of the waterways of Europe and those which exist on the waterways of the United States. These conditions, as we have just heard, are essentially different. Before going on with the discussion, I shall ask the General Reporter to be so kind as to give a summary of the question before us.

Professor Johnson (in English). — Mr. Chairman and Gentlemen of the Congress, I hoped that the discussion would bring out more information in regard to the mechanical appliances for reducing the cost of transferring traffic at terminals. The work which M. Wilkinson is doing in this Country to educate the American people as to the best methods of transportation by water may not be so well appreciated by the foreign delegates as it is by us who are here present.

We are all indebted very greatly to the work Mr. Wilkinson has done and is doing to get practical results, and what I wish to say is not in criticism of Mr. Wilkinson's position, but it is upon the same subject and from the same point of view but at a little different angle. I do not think that the railroads in this country are any more wicked than those in any other country where railroads are controlled by private corporations, because they seek to hold traffic against waterways; that is a natural thing for them to do. It should be remembered also that the American railroads are not in competition with high class waterways and that it is not implied that waterways in the United States are kept in such a condition as the Rhine and Elbe, as these waterways are maintained

in a continual high state of condition and are large carriers of traffic; but the waterways in the United States, as they exist today, and as they are equipped, are for the most part less efficient carriers than our highly efficient railways. If we are to have water transportation on a large scale we must solve the terminal questions which have been presented. That is the important question in this Country. As Mr. Wilkinson says, we have good channels on many of our rivers. General Bixby has also pointed that out, but, as Prof. Clapp says, we do not have the terminals and unless we have, them we cannot have the water transportation. In spite of the developement of water terminals, however, I, personally, do not look for a large use of rivers and canals in this Country with our efficient system of cheap transportation of bulky commodities by rail, except where two general conditions are met. The first of two conditions is : the presence, in the neighborhood of a waterway, of a large amount of heavy traffic, such as coal, minerals, forest products and similar articles, with the existence of large manufacturing industries using these materials.

Light articles, Prof. Clapp thinks can be transported by water; that could be done as supplemental and incidental to the larger traffic but not as traffic that alone will support water-ways. The second condition, in order to have large transportation by water in this or in any other country, is the presence near the water-way of a relatively dense population. Sixty-four per-cent of the traffic on the inland water-ways in Europe is on the Rhine and Elbe Rivers because these two rivers meet the conditions I have mentioned.

If the neighborhood has a relatively large volume of heavy traffic this is possible, and in that section of the country they have a relatively dense population.

In regard to what has been said by Mr. Coleman of New Orleans, I wish to observe that a man from New Orleans may say that the terminal question is primarily one of mechanical appliances today, but this is due to the fact that New Orleans has the best river port in the United States. If all ports in the United States were administered as is New Orleans, the future question would be one of economical and mechanical equipment for practically all inland

water-way ports. The first step is to secure public ports and then to connect rail and water carriers with these public ports. That is what I should like to see in connection with what Prof. Clapp said. The emphasis in this Country must be put upon the administration.

I think it quite certain, when we have river ports and when we have connected rail and water carriers, that the engineers in the United States, with the assistance of foreign co-operation will be able easily to equip our ports properly with efficient economic mechanical appliances.

The Chairman. — Colonel Beach has the floor.

Colonel Beach (in English). — Mr. Chairman and Gentlemen. There is, in the comparative statement made on the subject of the waterways of the United States and those of Europe, one point which seems to me not to have been mentioned. Having had the good fortune to be sent to Europe to examine navigation of all European waterways, and having a good deal of experience with the waterways in the United States, I think it a good plan to invite the attention of the members of the Congress to this condition, and that is the essentially different physical characteristics of the European and American rivers.

The Rhine, the Rhône and the Danube are held up to our notice as typical streams. They are, to a certain extent the most favored rivers of the world; not only do they flow through densely populated territory, but they have at their headwaters in the Alps abundant reserves of snow which, by their melting, furnish an abundant supply of water to these rivers during the hot months of the year, when the supply of water available for navigation in other streams is very small. This is particularly the case with the American rivers. There is in Texas a river of which the length is practically the same as that of the Rhine in Germany. At times, its discharge is as great as the maximum discharge of the Rhine and yet, under ordinary circumstances this Texas river is not navigable for more than a hundred miles above its mouth. The banks of the stream are high but they are made entirely of clay so that the conditions of the river are very different from those of one running through regions where the banks are composed of hard material. The fluc-

tuations between high and low water on the navigable rivers of Europe are scarcely comparable with those of the rivers of the United States. This oscillation on the Ohio River, at Cincinnati, is more than 20 metres. On the Black Warrior River, at Tuscaloosa a rise of 15 metres in two or three days is not uncommon.

The Rhine is practically paved from Mannheim to the sea and the water rarely ever leaves its bed. On the Mississippi River, at one point where I have charge, viz. the large lock which connects the Mississippi with the waterways to the West, there have been, until this last flood, buildings standing outside of the levee which were formerly the principal buildings on the main business street of the town. The river has penetrated half a mile into the town and forced it to move West. No such conditions exist in European countries. The quantity of timber or fallen trees floating on the stream or lodged along the banks is such, on many of our rivers, as to interfere with or even to stop navigation; this condition does not exist in Europe.

The excessive cost required to improve many of our rivers, with their unstable and crumbling banks has no parallel upon European waterways and it is almost incomprehensible to those who are not familiar with our conditions.

Transportation can be continued on the French and German waterways during a great part, if not the whole, of the year, as a rule. Navigation is stopped on the Elbe by ice for a few weeks only each Winter; it was also interrupted by low water last Summer for a period of four months. Some of our Northern rivers are closed by ice for such periods that commerce, interrupted on these lines, is obliged to seek others, the one adopted being generally the one by rail.

The point which I wished particularly to bring to the attention of the members of this Congress is this : While the German rivers and most of those in other parts of Europe have suitable banks and, in many cases, an adequate supply of water throughout the entire year, most of our streams, of which many flow through an alluvial bottom, have crumbling banks with a water supply which is very abundant during a large part of the year but wholly inadequate during the remainder.

The Chairman. — Has any one further remarks to make?

Mr. Harding has the floor.

Mr. Harding (in English). — Gentlemen I wish to add a few words to what I have already said. I want to tell you that at the foot of Broad Street in New York there is a Canal Station. I often go there. There are four or five different canal lines which come up through the Erie Canal and most of them are owned by railway companies, such as the Pennsylvania, the Lehigh and others. I desire to state that down there a very large proportion of that freight is carried by the canals up through Buffalo and then transferred on ships at the other end, and really is all high class freight. My experience in studying over the matter and in looking this over down there convinced me that there is far more value or profit in the carrying of that high class freight than low class or coarse freight that is being carried.

As you know, we expect a very large amount of increase of freight on the Barge Canal when it is completed. Being the Consulting Engineer of the several railroads I am in a position to state my opinion and I think that the feeling of antagonism against waterways by the railroads does not universally exist. If the waterways can get any business they will take it, and if the railroads can get any business they will take it; but there is a great change at present which has come over the country within the last few years due to the fact that many of the officers of the railroads—the Presidents and vice presidents and the others, are not all necessarily very large stock holders, and are not particularly interested, directly, in dividends. On the contrary, they are all anxious to get all the freight they can carry. It seems to me, after studying the transfer of freight at terminal points, that if we can take the freight, very cheaply, from a barge or boat and put it on the cars, or take it from the cars and put it back on the barges, as it comes and goes, there will be an enormous increase of traffic and of water freight. It really seems so to us and that is one of the motives of the New York State Barge Canal. The general practice is, and it is the experience of all who are interested in the matter, that railway companies try to get all the freight they can possibly

get, and the waterways using barges or large boats will be able to give the railways a very large amount of freight. It has been stated that eight billion dollars must be expended for the railway companies to be able to take care of the freight which is brought to them in the next five year. Now, the question is we are going to cut that eight billion dollars down. They have been taking these figures from the Chamber of Commerce in New York. They cannot get it. It seems impossible. They cannot raise the freight very much, as it is already as high as the freight will stand and the freight will naturally go to waterways with waterway facilities and terminals and machinery adapted to the economical handling of traffic. That seems to be the inevitable conclusion.

The Chairman (in English). — The question before us is : how we can formulate conclusions to be adopted by the Section and to be transmitted to the Congress at its last general meeting.

Professor Johnson (in English). — I suggest that the Chairman of the Section ask ten representatives of the Congress, of whom some six shall be foreign delegates, to assist in drawing up the conclusions.

The Chairman (in English). — Would Professor Johnson be willing to amend that suggestion by adding those members who took part in the discussion?

Professor Johnson (in English). — I shall be glad to accept that amendment.

The Chairman (in English). — All in favor of appointing a committee, as suggested by Professor Johnson, and of adding thereto all the members of the Section who took part in the discussion, will please signify their approval by saying aye.

The motion was carried unanimously.

There being no further business before the Section, the meeting adjourned at 5.30 P. M.

FIRST SECTION

(Inland Navigation)

FOURTH SESSION

Monday morning, May 23, 1912.

Mr. BOGART in the Chair.

The meeting was called to order at 9.30 o'clock, in the Assembly Hall of the Bellevue-Stratford Hotel.

The Chairman. — Gentlemen; Before taking up the discussion of the first communication laid down in the programme of this section, I must set before you the conclusions in regard to the **third question** reached by the sub-Committee which had charge of their preparation.

They are as follows:

1. The problem of combining, facilitating and harmonizing the transfer of freight between waterways and railways is partly administrative or governmental and partly technical or mechanical.

The co-operation of railroads with waterways should be secured by the effective regulation of railroad services by national, state and local governments. The legislative and administrative requirements of the several public authorities should so supplement each other as to make a unified transportation system of the railroads and waterways in each country.

2. It is essential that each port should be systematically organized for the accomodation of the traffic and the industries to be served. Experience conclusively shows the need of supplementing the use of privately developed terminals by the public ownership or control of the operation of wharves, docks, warehouses, and other harbor facilities for handling freights for public use. Exclusive private ownership of water terminals is indefensible.

3. The legislative and administrative measures to be taken to co-ordinate railroads and waterways, to unify and systematize port facilities and to provide an efficient harbor administration must vary with different countries.

4. The layout of intermediate and terminal ports and the mechanical appliances best adapted to the handling of traffic must be determined for each port separately and in accordance with its special requirements. Local city and state engineers must apply to the solution of local problems, and adapt to local conditions, the principles of port organization and operation that have been found effective at other ports and in other countries.

The conclusions as presented were approved unanimously by the Section.

The Chairman. — The examination of the **first communication** is in order. It is stated as follows:

Applications of reinforced concrete to hydraulic works.

This question has been treated in seven reports laid before the Congress by : Mr. Schnapp (Germany); Mr. Humphrey (United-States); Mr. Jacquinet (France); Mr. Vawdrey (Great Britain); the Direction of the National Water Service of Hungary; Mr. Perrilli (Italy) and Mr. Nikolsky (Russia).

I shall ask Mr. Glaudot, Secretary for Belgium, to be so kind as to read, in French, the conclusions of Mr. Sewell, the General Reporter.

Mr. **Glaudot** read the conclusions which were worded as follows:

Reinforced concrete combines the structural qualities of steel and timber with the durability of good masonry. It is subject to no form of deterioration which can not be avoided by reasonable precautions. It is free from many of the limitations surrounding the use of masonry in mass; because of the greater latitude it affords in the design and execution of structures, it often yields the best and most economical solution, and in some cases the only practicable solution, of the most difficult problems.

When properly designed and executed it is, therefore, among the most valuable, if not the most valuable material now available for use in connection with hydraulic works of all kinds.

The Chairman read the same conclusions in English. The members present considered it unnecessary to have them read in German.

The Chairman. — The general discussion is now in order. Mr. Voisin has the floor.

Mr. **Voisin** (in French), without presenting a summary of the report of his absent colleague, Mr. Jacquinot, Chief-Engineer at Chaumont, made especial mention of the case of a reservoir, built 39 years ago of reinforced concrete, which has given entire satisfaction. It is a particularly interesting result which deserves notice.

Mr. Voisin pointed out, also, that all the reports ended with favorable conclusions and that those of the General Reporter, Mr. Sewell, seemed to him to be acceptable.

Still, as the use of reinforced concrete was also under consideration by the second Section, he would think that the conclusions of the two sections should be alike, in so far as that might be possible, as had been the case formerly at Saint-Petersburg, omitting of course the special precautions which should be taken to insure the preservation of the concrete in sea water and which were the affair of the second Section only. Under these conditions, the conclusions of the General Reporter of the second Section, Colonel Burr, could be adopted with or without changes (p. 11 of his report.)

The Chairman. — A question similar to the one now before us has been, in fact, laid for examination before the second Section. I shall send for Colonel Burr's report that you may hear the conclusions of which Mr. Voisin has just spoken. Meanwhile, Mr. Humphrey has the floor.

Mr. **Humphrey** (in English). — Mr. Chairman; I desire to state that the subject is, in my opinion, too important for us to adopt conclusions without entering upon certain considerations, and as

the general conclusions are to be drawn up by the two Sections in order to be laid before a general meeting of the Congress, it seems to me desirable that a sub-Committee be appointed to prepare the draft of a resolution.

The Chairman. — Your proposition may be taken up again at a more propitious time.

Mr. Schulze has the floor.

Mr. **Schulze** (in German). — I should like to give a little information about the question under consideration, and, particularly, to point out that, if the article of the Reporter for Germany, Mr. Schnapp, was not turned in sufficiently in time to be laid before the Congress, it should not be assumed that the interest in the use of reinforced concrete is less in our country than in others. The many applications of this material made in Germany prove the contrary. I shall mention, among others, the bank protections, seven kilometres in length, at the port of Ruhrort, the quay walls built at Stettin, Berlin, Danzig, etc.

Several small locks on the Lower Oder were also built of reinforced concrete. Several other works, built of armored concrete, at Herne on the Rhine Canal should also be mentioned. This canal passes through a country where very extensive mining operations are going on and hence these works will be exposed to very great settlements; still other difficulties came up during the construction of this navigable highway and they could be overcome only by the use of reinforced concrete. Many other examples could also be brought forward.

Let us also mention the quite numerous firms who, in Germany, are carrying on works in reinforced concrete and who are following, both in theory and practice, the advance of science. Some of them are known throughout the world.

Beside the actual carrying on of work, scientific researches in the matter of reinforced concrete are conducted on a large scale in Germany; so, for example, the German Committee on Work of reinforced concrete is studying the static conditions of the question, and at Sylt, an endeavor is under way to find out how reinforced concrete behaves in salt water.

The voluminous treaty on reinforced concrete "Handbuch für Eisenbeton", on which a number of German writers have been engaged, also proves that the scientific study of the question, is a serious matter in our country.

The final conclusions which have been reached by Mr. Sewell, the General Reporter, agree on almost all essential points with what has been observed in Germany, hence there is nothing to interfere with adopting his conclusions.

To conclude, I propose that the very important question of the use of reinforced concrete be not dropped too soon from the programme of the Congresses of Navigation, and I ask that it be again placed on the order of business of the next Congress.

Mr. **Hilgard** translated into French and English what Mr. Schulze had said.

The Chairman. — I have just received a few copies of the general report prepared by Colonel Burr for the second communication of the second Section. Here, the question has been stated as follows:

"Report on the most recent works constructed at the more important sea ports and especially on those relating to breakwaters. Applications of reinforced concrete; means for insuring its preservation."

Hence it is especially a question of structures in sea water, whereas the question submitted to our Section is rather more general.

If Mr. Voisin should wish to take the floor again, he might finish his explanations.

Mr. **Voisin** (in French). — All misunderstanding should be cleared up.

The question should be considered under two forms.

Looked at from the fresh water point of view, it is merely necessary to see whether reinforced concrete answers to the demands made upon it.

Examined from the salt water side, there are also to be studied the special precautions to be taken for the preservation of

reinforced concrete, and this is a matter for the second Section alone.

Hence I say nothing about this second part and confine myself to the first, that of the suitability of the use of reinforced concrete; in this respect, the two Sections should reach similar conclusions.

Furthermore, according to Mr. Humphrey, formal conclusions on the question of the use of reinforced concrete in salt water cannot be uttered at the present time.

I agree absolutely with this opinion. When it is remembered how very recent are the applications of reinforced concrete in sea water, final conclusions cannot yet be laid down. The mission of speaking exactly on this point will belong to our future Congresses.

Returning to the question of the suitability of the use of reinforced concrete, I consider that the two Sections should come to a uniform conclusion.

As I said a moment ago, we might adopt the conclusions of Colonel Burr, with or without change, and then leave to the second Section the care of drawing up its own conclusions while taking those of the first Section into consideration. Colonel Burr reached the following conclusions on page 11 of his report :

“ Experience to the present time demonstrates that the engineer
” has in reinforced concrete a valuable device suitable for applica-
” tion to a wide and increasing variety of structures and it merely
” rests with him to apply it properly. Many heretofore undevelop-
” ed or obscure points in theory and in practice have been cleared
” up, but others remain for further study and in this direction, as
” well as in the improvement of the details of design, lie the most
” important fields for future investigation. ”

The Chairman. — Mr. Dabat has the floor.

Mr. **Dabat** (in French). — It should be noticed that there is quite a marked difference between the conclusions of the Section on Inland Navigation and those of the Section on Ocean Navigation.

As Mr. Voisin has just explained, there are differences of application by reason of the different conditions of use with salt water and with fresh. Hence, it follows that the opinions of the

Sections cannot be the same. Then it is simpler and more logical for the Section on Inland Navigation to express its opinion which is clear, firm and wholly favorable to the use of reinforced concrete.

As to the Section on Ocean Navigation, it can add a paragraph which will be a little less decided in what relates to the use of cement in salt water.

Therefore my conclusion is that our Section vote on the proposition of the General Reporter, Mr. Sewell, with this suggestion that the Section on Ocean Navigation add a complementary paragraph.

The Chairman. — Mr. Voisin has the floor.

Mr. **Voisin** (in French). — We can be much more liberal in connection with concrete used in fresh water than with that which is placed in salt water. But nothing prevents the adoption of the same conclusions in the two cases. This can be said perfectly well in a uniform wording by amalgamating the two conclusions. In this way, the Philadelphia Congress will have done naught else than what was done by the Congress of Saint-Petersburg. There too, two questions were before the meeting: the one concerning fresh water, the other, salt water.

The two Sections met and succeeded in obtaining the single wording of a conclusion. The same thing can be accomplished here, but more precisely, however, than at Saint-Petersburg.

We might say, for example, that reinforced concrete can be used almost without restriction in fresh water, but that prudence must be exercised when it is employed in salt water and more or less important restrictions can be added. It would be easy in this way to give effect to the desire expressed by the two Sections.

The Chairman. — Mr. Dabat has the floor.

Mr. **Dabat** (in French). — I think then, Gentlemen, that we are agreed; that is to say, that the first Section should draw up the conclusions and that the second Section should be asked to add a paragraph about the use of reinforced concrete in salt water.

We have great works under construction in France and I should not like to see any hesitation exist about the employment of reinforced concrete in maritime works.

So far as its use in fresh water is concerned, I insist upon the acceptance of the conclusions laid before us by Mr. Sewell, our General Reporter.

Mr. **Voisin** — I agree to this proposition which, after all, does not differ from mine.

The Chairman (in English). — In addition to the conclusions which Mr. Voisin has read to us, Colonel Burr also has formulated general conclusions which will be submitted this afternoon to the second Section and of which I think that you should know the terms. These general conclusions are as follows:

"1) Further experience tends to confirm the conclusion of the Congress of 1908 that the earlier results of the application of reinforced concrete to hydraulic works are encouraging and seem to indicate that reinforced concrete may be expected to be reasonably permanent in sea water if the precautions necessary to secure that end are intelligently and unremittingly exercised in accordance with the best experience in such works.

"2) In view of the comparative novelty of this type of construction, its increasingly wide application and the rapidly growing experience in its use, this subject should again be made a question for consideration at the next Congress."

The Chairman. — Mr. Humphrey has the floor.

Mr. **Humphrey** (in English). — If, in conformity with custom, each of the Sections were to adopt the conclusions of its General Reporter, the Congress would be placed in the embarrassing position of having to choose between two sets of conclusions or of having to coordinate them.

It would be well to anticipate this difficulty and that is why I ask that, after the discussion of the question, the preparation of the conclusions be confided to a special Committee.

So far as the application of reinforced concrete to hydraulic

works in general is concerned, it appears to me that it involves a point of tangency when the passage from inland navigation to maritime navigation is made and that at this point the effect of salt water on concrete walls is felt as much as the effect of fresh water. The point which should be studied carefully is the action of brackish water on concrete, especially in regard to frost, which many of us consider to be a fundamental cause of disintegration. But concrete has been long in use, both for works in salt water and for other hydraulic works and the processes adopted for its use have been, there is no doubt, greatly perfected since then. I am not a partisan, therefore, of International Congresses discussing this question every three or four years, and then separating without taking any positive position, being content merely to put off to a later Congress. In my opinion, there are at hand plenty of proofs of the durability of reinforced concrete in fresh water to warrant putting forth a very clear conclusion.

As to the use of this material in salt water, I admit that no exclusive conclusion should be attempted, but the results already acquired by experience can, at least, be noted.

As a matter of fact, those of us who have followed the work done in laboratories for determining the action of salt water on concrete, and who have examined constructions built of concrete in the sea twenty-five years or more ago, are perfectly convinced that concrete is and can be used successfully and on a large scale under good conditions of durability. Hence we should like to have the Congress draw up a categorical conclusion and recommend the application of reinforced concrete, both in salt water and in fresh.

The Chairman. — Mr. Ripley has the floor.

Mr. Ripley. (English). — Mr. Chairman and Gentlemen;

The findings of the General Reporter on this subject of the "Application of reinforced concrete to hydraulic works" strikes me as being at fault in two particulars. First; they do not cover the matter comprehensively and, secondly, they claim too much for reinforced concrete. Particularly would I call your attention to the last paragraph and request that the words "if not the most valuable" be stricken out.

Reinforced concrete was born of the union of mass concrete with steel and we, as a body, are not prepared, at the present time, to give to the child all the attributes and more which belong to the parents. You will, I believe, agree with me when you stop to consider that we have much yet to learn and much to teach regarding the building of mass concrete.

In our northern latitudes, in particular, reinforced concrete is a material which must be handled with great care. This Congress should not go on record as advocating its use as "the best material" as the findings in the office and drafting room can be, and frequently are, upset by the men in the field. The greatest care on the part of the field engineers cannot always prevent freezing and the consequent reduction of cross section. A little bad sand or crusher dust will cause a like effect and often such defects and the extent of them cannot be determined until several months after the concrete is placed in the forms. I know these conditions to be a fact, having seen work on the Barge Canal construction, where the inspection is good, affected in this manner.

The loss of an inch or a few inches of concrete surface from a piece of mass concrete will seldom endanger its integrity, but how much more serious is such a loss when it comes on a thin reinforced wall; the loss in cross-sectional area is not only many times greater proportionately but the reinforcement is liable to become exposed and then its destruction soon follows.

No structures built by engineers, probably, contain more of the personal factor in their formation than those built of concrete and this "personal factor" must always be taken into account.

The-man-on-the-wall is attempting to do in a short period what the Creator has taken centuries to do—make stone—to subject him to the added risks of many points of attack in place of a few, which is the case when reinforced concrete with its many angles and diminished volume is substituted for mass work, is adding an unwarranted burden in many instances.

Experience has taught that the personal factor must be considered and the text book must be used understandingly and not always literally; moreover that a saving in construction on paper may result in an actual loss in construction in the field. There-

fore, gentlemen, I respectfully request that these findings be carefully considered and materially revised.

The Chairman, leaving the chair and taking the floor said (in English):

The speech which we have just heard is, certainly, very interesting in spite of the criticisms directed against Mr. Sewell's conclusions. Mr. Ripley declares that he cannot accept these conclusions, and we can only regret that he has not laid before the Congress a report in which he could have set forth the ideas which his wide experience might have suggested and which, in connection with other articles placed at our disposal, would have enabled us to reach conclusions with fuller knowledge of the case.

The feeling which seems to prevail among the members of the Section is to let the question of reinforced concrete stand over for further consideration. If, on the contrary, conclusions had to be drawn up, it is my thought that we should confine ourselves to generalities, without going into details and without lauding methods of construction. These methods may not be set forth in articles laid before the Congress.

Mr. **Ripley** (in English). — Mr. Chairman, What I said may not have been sufficiently clear, but I have no desire whatever to see this or that special method of doing work recommended in the conclusions of this Congress. The point which I wish to make, on the contrary, is : that no opinion should be put forth by the members of this Section declaring that such or such particular kind of concrete is the best, and that the engineers who compose this Congress, most of them being actively engaged in professional work, should not carry away the impression or read in the minutes of the proceedings that the proposed conclusions express the formal feeling of the Congress.

The Chairman (in English). — If I understood rightly what was said a while ago, our Vice-Chairman, Mr. Dabat, is of the opinion that this Section should reach some decision about the subject under consideration, even though it be, on many points, the same as that which will be submitted this afternoon to the second

Section; then that a sub-Committee should draw up for us conclusions in conformity with the idea brought out during our discussion. These conclusions are then to be transmitted to the second Section, so that the latter might take them into consideration in the conclusions which it will itself deduce from the examination of the question.

Mr. **Humphrey** (in English). — Would it not be more to the point to name a sub-Committee, to be made up of members from both Sections to prepare a draft of the conclusions to be presented to the Congress.

The Chairman. — Mr. Dabat's proposition has to be examined first, but the discussion is not finished.

Colonel Yorke has the floor.

Colonel Yorke (in English). — Mr. Chairman and Gentlemen; Mr. Ripley uttered, a moment ago, an important objection in the matter of the conclusions submitted for the approval of our meeting. Although not prepared to speak during this session, I should like to say a few words about them. Two years ago, the Society of Civil Engineers of England appointed a Committee to study thoroughly the question of reinforced concrete. This Committee is still continuing its work. It has collected already a great mass of information but it cannot yet, by any possibility, formulate any final conclusions. I am a member of this Committee and, after having been present at its deliberations, I believe that I am authorized to ask, with Mr. Ripley, that the words "if not the most valuable" be stricken out from the text of the conclusions.

There is one point to which I should like to draw your attention; it is the following: although the cement and the steel bars may be tested, the sand and other materials be carefully weighed and mixed, there still remains a factor which it is impossible to know before the work is done. The adherence which should exist between the bars of steel and the concrete may indeed be known, but there is no way of verifying it and of determining, before the work is finished, whether the bond wished for have been obtained; afterwards, it is too late. This factor depends entirely on the way in

which the work has been performed and, in view of its very great importance, it should be possible to exercise such a strict oversight on this point that to do so appears to be out of the question.

The Chairman. — Mr. Smrcek has the floor.

Mr. **Smrcek** (in German). — Gentlemen; Opinions have been expressed for and against the use of reinforced concrete. It is a fact that, so far, we do not know whether constructions of reinforced concrete can last 100, 200, 300, 400 or 500 years; but we are not building such works for thousands of years, we are putting them up—and I think that we should be satisfied with this result—for a period of about 50 years, and these works will certainly last as long as that. If the use of reinforced concrete raised too many scruples on our part, we should make little progress. Hence, I think that we should not show too great fear, nor should we prepare conclusions unfavorable to the use of reinforced concrete.

Mr. **Flamm** translated into French and English what Mr. Smrcek had said.

The Chairman (in English). — Gentlemen, If no one else wishes the floor, we might take up the proposition made by M. Dabat. Its intention is to have this Section prepare conclusions which will be transmitted to the second Section for its consideration. It is wholly a secondary matter to have a sub-Committee of the first Section meet a sub-Committee of the second Section in order to reach general conclusions.

Mr. Voisin has the floor.

Mr. **Voisin** (in French). — The conclusions brought in by the General Reporter might be adopted. All the same, I shall ask that a slight change be made in the first sentence of the French version, which might be replaced by the following :

“Reinforced concrete combines the qualities both of the metal” and the masonry.”

The second Section would then add its conclusions to ours.

Major Oakes considered that the wording "combines the qualities both of the metal and the masonry" was too absolute.

Messrs. **Voisin** and **Oakes** agreed to say that reinforced concrete combines "most of the qualities" of the metal and the masonry.

The Chairman. — Mr. Germelmann has the floor.

Mr. **Germelmann** (in German). — I take the liberty of pointing out to the Section that it is not the habit of the Congress to draw up conclusions in regard to the subjects of communications. Hence I insist that the usage observed during former sessions be still followed, and that the Section abandon the idea of drawing up conclusions which the Congress will be sure not to accept.

The Chairman. — Mr. Smrcek has the floor.

Mr. **Smrcek** (in German). — I have already addressed the President's office on this subject and I can only confirm this fact that conclusions in regard to "communications" have never been adopted. I should like even to guard against any tendency toward desiring to establish, for "communications," conclusions which may be too premature, because bad use might be made of them from time to time and even for purposes of advertisement. I remember what a struggle had to be made on this point in the matter of the different kinds of shutters, dams and dry docks. We should hold to old customs and draw up conclusions for the "questions" alone and not for the "communications". I stand, therefore, by the opinion of the preceding speaker.

Mr. **Flamm** translated into French and English what Mr. Smrcek had said.

The Chairman. — Mr. Voisin has the floor.

Mr. **Voisin** (in French). — The text of the by-laws says that no decision should be taken on a communication.

Hence, the discussion should be closed and no determination be reached.

I believe, however, that it should be observed that the two Sections united at St. Petersburg, on this very communication and reached a conclusion.

Under these conditions, and in view of the precedent, I think that the same thing might be done again to-day.

On the other hand, it is feared that certain commercial operations might be favored by such action.

I do not believe in this fear. There is no question, in any of the reports, of any special system of constructions of reinforced concrete, be it the Hennebique, or an English, or a Germain system or any other system under the sun. Only reinforced concrete has been mentioned.

No indication has been given as to the use of one or the other of the existing systems and therefore, under these conditions, the fears mentioned above seem to be chimerical.

Consequently there remains only the question of knowing whether the by-laws shall be obeyed or the precedent be followed.

It seems hard not to be able to say anything new after four years of new experience.

So I propose either that a decision be taken or that a meeting of the two Sections take place.

Mr. **Flamm** translated what Mr. Voisin had said into German and English.

The Chairman (in English). — It is true that no conclusions should be taken on the "communications".

Still, an exception to this rule has been mentioned, and furthermore we are now examining a general report to which conclusions are attached. But, on the other hand, these conclusions seem too categorical, even though a slight modification have been proposed; besides, they will not be approved by the general meeting of the Congress.

Major Oakes (in English). — As the Chairman has observed, the conclusions of the general report seem to be too categorical. Nothing has been said, for example, on the subject of the electrol-

ysis which may be caused in steel covered with concrete, in constructions where electricity is used on a large scale.

Now, this phenomenon has been caused in certain cases. Hence the bearing of the conclusions as presented is too general and should be limited.

Mr. **Ripley** (in English). — I do not think that we are prepared to stand by these conclusions.

The Chairman. — Mr. Dabat has the floor.

Mr. **Dabat** (in French). — Mr. Voisin said a while ago that the question of reinforced concrete had already been before the Congress of Saint-Petersburg. If, therefore, no decision be reached now, it might be believed that there is something to be said against reinforced concrete.

The by-laws are formal, but they have been overstepped already at Saint-Petersburg, and the subject is too important for us to appear to neglect it.

A resolution might be passed and we should prove in this way that the question has not been slighted.

It is hard to admit that the General Reporter should have been called on the present a certain work and that we should go our ways without reaching any decision.

Mr. **Humphrey** (in English). — It would be well, as I have proposed already, to appoint a sub-Committee to present a draft of the conclusions.

The Chairman. — Mr. Schmidt has the floor.

Mr. **Schmidt** (in German). — I think that we should stand by the ruling principle and not prepare conclusions when a "communication" is before us. If a resolution should be taken along these lines, let it be so in three years, after reinforced concrete shall have been discussed again at the next Congress under the form of a "question" and no longer as a "communication"; but let us not depart from established customs.

The Chairman. — Mr. Voisin has the floor.

Mr. **Voisin** (in French). — To do nothing but talk for several hours about reinforced concrete without coming to any decision seems to me abnormal and regrettable.

By doing what was done at Saint-Petersburg, the question would be solved, as the proposal would be made to lay the matter over until the next Congress and then to have it taken up as a "question" and no more as a communication.

The Chairman. — Mr. Hoerschelmann has the floor.

Mr. **Hoerschelmann** (in French). — Could not a way be found out of this dilemma by not stating any determined conclusions, but by merely saying that the Section appreciates highly the conclusions of the General Reporter and resolves that the problem of reinforced concrete be carried over as a "question" to the programme of the next Congress.

Mr. **Humphrey** (in English). — Would it not be proper, in transmitting this proposition, to state the reasons which justify it?

Major Ockerson (in English). — I agree with Mr. Humphrey. It would be well to bring out clearly that the Reporters from the different countries have told how the application of reinforced concrete to hydraulic works has advanced and that this same subject should appear as a "question" on the order of business of the next Congress.

The Chairman (in English). — The discussion may not go on indefinitely. I shall call for a vote on the proposition of passing a resolution having as its object to carry the subject of reinforced concrete over to the programme of the next Congress.

This proposition was generally agreed to by the meeting.

The Chairman. — Mr. Humphrey has the floor.

Mr. **Humphrey** (in English). — I do not oppose preparing a resolution in this sense, but would it not still be desirable to appoint

a committee to prepare and frame, on the subject under consideration, conclusions which should be submitted for the approval of the next Congress. A General Reporter who receives and examines individual reports is lead, naturally, to prepare his conclusions in accordance with his personal preferences. Now, in so important a matter as this of reinforced concrete, it would be better to have the opinions of the various countries condensed by a committee and to have the text resulting from this labor presented as a conclusion at the next Congress.

The Chairman. — Mr. Ripley has the floor.

Mr. Ripley (in English). — I do not see the opportuneness of this proposition. The International Association of Congresses of Navigation has adopted a general method for carrying on its work, and, unless there be found a decided advantage in so doing, I see no reason why we should follow new methods. All the articles presented to the Congress are analyzed by a General Reporter who gives out conclusions. These are discussed at a session of the Section, then they are sent eventually to sub-Committee which prepares final conclusions and these last are adopted by the meeting with or without change.

The conclusions reached by the General Reporter are not, therefore, always final. The process followed allows the discussion to be confined to the conclusions of the General Reporter and the observations which they call forth to be presented, instead of having to examine a series of texts of conclusions. It leads exactly to the same result as that which would be reached if a special Committee were appointed to prepare resolutions.

Hence, I see no necessity for changing the procedure.

The Chairman (in English). — I am exactly of Mr. Ripley's opinion. We were unanimous a moment ago in deciding to vote a resolution to have the subject of reinforced concrete placed again on the order of business of the next Congress in the form of a "question". We cannot keep up this discussion any longer.

Mr. Engels has the floor.

Mr. Engels (in English). — The appointment of a special Committee, as called for by Mr. Humphrey, would be contrary to our by-laws. The preparatory work for a Congress falls upon the Permanent Board of the Association, of which I have the honor to be a member. As in the past, this Board should regulate the steps to be taken in order to present the subjects to be studied. It would infringe upon the by-laws and create a precedent if there were formed, outside of the Permanent Board, a special Committee to study this or that subject.

Mr. Humphrey. — I withdraw my proposition if it be contrary to the by-laws of the Association.

The Chairman. — The proposition is withdrawn.
Mr. Dabat has the floor.

Mr. Dabat (in French). — I come back to the resolution to be prepared; agreeing with Mr. Voisin, it might be worded as follows:

"The Section, after having examined the interesting reports which have been published on the subject of reinforced concrete, and after a long discussion :

"Whereas the use of reinforced concrete is a matter of great importance, and whereas the experience acquired will, doubtless, soon enable an exact conclusion to be reached,

"Resolves that reinforced concrete be placed on the order of business of the next Congress and that it be there treated as a question."

The Chairman. — I think that this resolution as it has just been expressed meets the sentiments of the first Section. (*Unanimous consent and applause.*)

The Chairman. — The resolution is carried.

The order of business puts off until this afternoon the discussion of the second and third communications of our programme. Would you not prefer, Gentlemen, to take the second communication up now and, if possible, to start afterwards the discussion of the third, so as to be able to separate this morning itself?

Most of the members agreed to this.

The Chairman. — So, we shall go on with our work.

Gentlemen, *the second communication* is worded as follows :

“Report on the works undertaken and the measures adopted or proposed for the improvement and development of lines of inland navigation, as well as for the protection of the banks of navigable highways.”

Ten reports have been made on this subject by : Mr. Bergius (Germany), Messrs. Marote and Descans (Belgium), Mr. Connor (United States), Mr. Dusuzeau (France), Mr. Saner (Great Britain), Messrs. Castiglione and Beretta (Italy), Mr. Van Loon (Netherlands), Mr. Wodarsky and Mr. Hoerschelmann (Russia) and Mr. Malm (Sweden).

Lieutenant-Colonel Newcomer, General Reporter of this question, has drawn up no conclusions, but, all the same, the subject can be discussed.

Mr. de Hoerschelmann has the floor.

Mr. de Hoerschelmann (in French). — I should like to add a few complementary explanations to my article.

Since last year, when I prepared my communication on the preliminary project for improving the navigation of the cataracts of the Dnieper by utilizing the water power of the cataracts themselves, this project, which had been worked out by Messrs. Roundo and Youskovitch, Engineers of Lines of Communication, was revised by two other Engineers : Mr. Sourgevitch, Chief of the Administration of Lines of Communication for the district of Kieff, in which the cataracts of the Dnieper are situated, and Mr. Rozof, Assistant Chief of Section in this same district.

Borings made at the sites proposed for the dams, showed that the solid rock in the bed of the river is found at a great depth, as much even as 12 metres, underneath the bed above these sites, whereas immediately below the fall, it lies at an insignificant depth below the bottom. This explains the very origin of the cataracts which have been formed gradually in the course of ages. The bed of the cataract is made up of an agglomeration of large blocks of rock cemented together by means of mud and sand, the

mass forming but one step in the longitudinal profile of the river, whereas immediately below the cataract the bottom of the river is cleared of rocky blocks and alluvium by the exceptional strength of the current and the shock of the ice which carry them further down stream.

Consequently it was decided to place the four dams proposed, not above the respective falls but below, thus increasing their height and volume and also strengthening their foundations.

As stated in my report, the installation of a large number of electric plants of small power, scattered around at various points, is not advantageous either in the matter of first cost or of industrial management. But, on the other hand, the tendency to concentrate the fall of the water as much as possible is restricted within certain limits. Especially is it not possible to extend unduly, by means of very high dams, the submersion of riparian land which, along the torrential part of the Dnieper, is thickly settled and very valuable. This is the condition most of all at the city of Iekatherinoslaf. The even temporary submersion, at times of high water, of certain quarters of this city would be the cause of serious trouble. This is why it was proposed, in the complementary study of the project, to avoid such submersion completely and to allow, within the limits of the town, no additional increase of high water by reason of the pools formed by the proposed dams. This was recognized as necessary in order to avoid the serious complications which would certainly be raised by land owners at Iekatherinoslaf for damages and indemnities. Hence it became obligatory to restrict appreciably the height of the first dam, built at the Sourski fall. Its height had to be set so that the level of the pool, even at time of high water, would not extend up stream beyond the Staronaidakski fall which lies between the city of Iekatherinoslaf and the first dam (Sourski). With this end in view, the crest of the waste weir of this dam has been lowered by about 3 metres. It is true that this arrangement causes a loss of a part of the motive power which might have been obtained from the fall, but this consideration cannot make up for the great disadvantages of submerging a part of the city. Now, by lowering the crest of the Sourski dam, the Staro-Vaïdakski cataract will no longer contain a depth of water sufficient for

navigation, therefore there will have to be dug, to the right of this cataract, a lateral canal in the bed of the river, with a lock to pass the boats from the pool above to the pool below and the reverse.

Another marked improvement has been made in the project. Matters have been arranged so as to reduce sensibly the too great velocity of the high water current at a few parts of the river and so to prolong the season of navigation. There exist in the space covered by the cataracts two sections, each from two to three kilometres long, in which the width of the river does not exceed 200 metres while it reaches a breadth of a kilometre on an average. These two sections of the river are situated one above the Volnigski cataract and the other a few kilometres below the last or Volny cataract.

Currents having a velocity of more than 5 metres a second are found at these places at times of high water. This makes navigation very dangerous if it do not stop it altogether. In order to reduce these excessive velocities, the Volnigski dam is placed below the narrow part of the bed of the river; the cross-section of the water is much increased by the pool formed by the dam with the result that the velocity of the current is reduced. The same object is attained below the last Volny cataract, near the village of Kitchekasse by digging a canal with locks around the narrow part of the bed of the river. This solution is favored by exceptionally advantageous local conditions; especially a lateral ravine which can be used perfectly well for digging the canal with locks.

Such are the improvements made recently in the project; it is hoped that they will hasten its achievement which is of the highest importance for the inland navigation of our country.

The Chairman. — Mr. Merczyng has the floor.

Mr. Merczyng (in French). — I should like to add to Mr. de Hoerschelmann's report on the project for the canalization of the Dnieper, a few data in relation to the electric enterprise which will complete the hydraulic project.

Four great electric stations are to be created, each one capable of developing 100,000 HP. The current will be transmitted under

a pressure of 67,000 volts, and perhaps this voltage will be raised if experience shows, at the time of construction, the possibility of doing away with the losses now caused to high voltage by the ozonification of the atmosphere. The cost of the energy furnished will be two kopecks (= \$0.01) per kilowatt hour, the price accepted by the manufacturers of the town of Iekaterinoslaf.

The Chairman. — Mr. Smrcek has the floor.

Mr. **Smrcek** (in German). — The question which has just been taken up is very closely related to the first question which has been discussed already in this Section, and which bore on cases wherein a river should be canalized or regulated, or made navigable by means of lateral canals. Gentlemen, there are, unfortunately, a few rivers on which, by reason of the inopportune construction of lateral canals without locks, the conditions of navigation have scarcely been improved. I shall only bring up the works for the regulation of the Danube at the Iron Gate, where, by reason of the construction of a lateral canal, the water has acquired such a velocity that only the most powerful towboats are able to go up this canal, and it has become necessary to keep a boat permanently at this point to replace the light-powered tugs, in order to bring the barges up against the current by means of a traction cable.

Similar unfortunate experiences should be brought to the knowledge of everyone in interested circles, so as to profit by them and not to use the same method unadvisedly elsewhere. As an absolutely independent man, I feel myself drawn also toward inviting attention to regulating works for rivers which have not turned out well. I approve the works for improving the navigability of the Dnieper by means of lateral canals closed at the ends by locks. But the way in which the details are carried out is of the utmost importance for the success to be obtained, because, Gentlemen, the boatmen take their standpoint and form their judgment only by the results, and they are right when they ask us Engineers to regulate the rivers as they should be regulated and not to spoil them.

The Chairman. — Mr. de Hoeschelmann has the floor.

Mr. de Hoerschelmann (in French). — Mr. Smrcek has just said that regulation must not be defective. We agree fully with this, and that is why resort has been had to canals with locks, in which there is scarcely any current.

The Chairman. — Mr. Germelmann has the floor.

Mr. Germelmann (in German). — The subject now before us has been already the object of a resolution when the first question of our programme was under discussion. It seems to me therefore inadvisable to wish to hold another deliberation on the different points which were its object; this course might easily give rise to new divergences of views. We should, in my opinion, be satisfied with thanking the authors of the communications for their very instructive work.

The Chairman (in English). — This is also my view. Does any one else desire the floor?

As no one had anything further to say, the Chairman announced that the third communication would be taken up for discussion. It is worded as follows :

Utilization of the navigation of large but shallow rivers. Vessels and motors.

This subject has been treated in four reports laid before the Congress by: Mr. Blümcke (Germany), Colonel Townsend (United States), Mr. Rayner (Great-Britain) and Mr. Merczyng (Russia).

The Chairman asked Colonel Beach, the General Reporter of the communication, to be so kind as to open the discussion.

Colonel Beach (in English). — Mr. Chairman and Gentlemen; The conclusions reached by your General Reporter are rather meagre, but you will excuse him if you examine the papers. In fact I wish to say that the four communications received did not

touch each other in any respect. One is a comparison by Herr Brumcke between wheel boats and tunnel boats, as to transportation; another is a comparison of rail and water transportation in the United States by Colonel Townsend. The third is a description of the advantages of the Yarrow flap on canal boats, and the fourth is not much more than a list of motor boats on certain rivers in Russia. Under these circumstances, the General Reporter had no comparisons to make between the different papers, and, as to the conclusions, he could do nothing further than merely state that, so far as the data presented were concerned, the various conclusions seemed to be correctly drawn. There were a couple of points, given in Herr Blumcke's paper, on which we were not quite clear. One was, that in the tunnel boat he showed a much smaller number of firemen or stokers employed than in the side-wheeler and I could not understand why that was so; it seems to be a point which he should have cleared up. The other feature in the paper to which I refer is that I think he made a little too great an allowance for the difference in draught between the stage at which the side-wheel boat did the work and that at which the tunnel boat did its work.

Herr Blumcke is a man whose opinions I would regard as having a very great weight, and I consider him a most excellent authority in this matter. He is a man not only well informed on the subject, but he has considered it from the most practical side and I should hesitate very much to oppose my opinion to his. I simply wish to be enlightened.

On account of the above considerations the General Reporter was limited to state that, so far as he could see, the conclusions were well drawn from the facts presented.

The Chairman. — Mr. Flamm has the floor.

Mr. Flamm (in German). — Gentlemen; The report in which Mr. Blümcke endeavors to determine whether paddle wheels or screw propellers should be used for the navigation of a given river, gives me the opportunity, as a boat builder, to make a closer examination of this point. It is scarcely possible to elucidate the question, by merely drawing a parallel, as the author of

the report has done, between a steamboat with paddle wheels and a steamboat with a screw propeller of quite different dimensions. I consider the matter as an absurdity from a double point of view. In the first place and in so far as the boats are concerned, the start should be made from a same base of comparison then there remains to be known the way in which the propeller behaves as to its degree of action. I can build for you several propeller wheels of which every one will have a very different efficiency.

It is important to know how the screw is made and how it is fitted to the boat. While taking these considerations into account, tables of comparison relating to the cost and the economy obtained should also be prepared with the greatest attention. Misleading figures can be put forward, and I desire above all things to sound a warning against the confidence in which such data might be held.

The course to be followed is simplified, at the present time, by the tests with models which are now in vogue. I think that it is just as well to be rather on our guard in considering the comparison placed before us, and, in spite of my great desire to stand by what the Reporter of the question has said, regret that I am unable to do so, and for many reasons.

Then again, in the question of the use of motors on board of boats, I shall allow myself, here again and with full conviction, to advise all those whom this question may interest, to go ahead very cautiously.

There is, so to speak, no subject which has been so noised abroad and about which so many assertions have been put forth, during the past few years, as in the case of this use of motors on board. When a firm recommends its motor to you, I advise you to answer as follows : "This is all very well; I will give you an opportunity to place your motor on one of my boats, but I should like to insert the following clauses in the contract : the motor will not be accepted until it is set up on board of the boat; it will give the boat a speed of x knots and will have to work at will, and still not consume more than a given number of kilogrammes of fuel". Suppose that you have placed a motor on a boat, then that, with this boat, you have run into a fog and that you have been obliged to run the motor for a time long enough to consume

all the compressed air contained in the tanks, what will you do then? You will merely remain at rest, if you have not at your disposal on board a small auxiliary engine and an auxiliary compressor to pump a new supply of air into the tanks and so put the main engine in condition to continue to run. These are important points which the owner and builder of the vessel should consider. When a motor is ordered, I always recommend a careful prevision of the conditions which lay down exactly what you wish to have, whether as a vessel owner or as a vessel builder. If the firm accept the contract and if, above all, it agree to abide by the future conventional penalties, you can give the order for the engine and go your way in peace; but if the house be not willing to meet your demands, I warn you to make no contract therewith.

Engines are approaching perfection more and more every day. The motor has surely its advantages, but we must not claim for it too many good points. Prudence should be exercised in its use.

The Chairman. — As no one else desires the floor we may consider the labors of our Section as at an end.

Gentlemen and Members of the Congress who have been good enough to attend the meetings of the First Section, I, as President of the Section, desire to thank you for the kindness and courtesy which you have shown to your presiding officer. It has been a great pleasure to me to be able to preside over a meeting of such men as have assembled here, both American and foreign, and in particular I desire to extend my thanks to the members who have come from abroad and who have devoted so much time, thought and consideration to the business of the Congress.

It has brought to us here, in the United States, a larger and fuller appreciation of what this Congress means to the navigation interests of the world, and I feel deeply indebted to all of you, and I know that I express the sentiments of all of those members of the **International Navigation Congress** who live in the United States when I say, that we highly and deeply appreciate the visit of the foreign members, the interest which they have taken and the great importance of the contributions they have made to the discussion upon Inland Navigation. (*Applause.*)

Mr. de Hoerschelmann (in French with final address in English). — Mr. Chairman, Gentlemen and dear Colleagues; I had the honor of being the Chairman of the first Section at the last International Congress of Navigation, held in Russia, at Saint-Petersburg, in 1908. As such, I now ask to be allowed to say a few words to our very worthy Presidents and to the American members of our Section.

Saint-Petersburg lies in longitude 30° East, whereas Philadelphia is at 75° West. Hence there is difference of 105 degrees which, at the mean latitude of these two cities, gives as the bird flies a distance of more than 7,000 kilometres or nearly 4,400 English miles. If, in spite of this enormous distance which is still further increased by the Ocean lying between Europe and America, our Congress of Saint-Petersburg was still honored by the visit of several of our eminent American colleagues, and if there be found at our present meeting, in like manner, some delegates from our distant land as members to this Congress, there is, evidently, some strong reason which leads the Engineers of the two countries to start upon such long trips in order to take part mutually in the Congresses held in countries so far removed the one from the other. This reason is to be found, doubtless, in the similarity of the natural conditions which affect a large part of the navigable highways of the two States. In the United States, as in Russia, there are many very large streams, several of which are affected by pretty rigorous climatic conditions which are the sources of great difficulties for navigation during the periods when the ice is forming and breaking up, and which put a complete stop to navigation during the winter. We Russian engineers listened with most vivid attention, four years ago at Saint Petersburg, to the highly interesting statements which our American colleagues were so kind as to lay before the Congress, in their very thoroughly prepared reports on the improvement of the navigability of the rivers of North America. Now, we are happy in being able to take part in the XIIth International Congress of Navigation, where our American colleagues again come to show us the results of their great experience and their profound learning in the questions of the improvement of the navigability of the powerful streams of their superb country, and we have the good

fortune of being able to visit personally a few of these rivers during the excursions to which our kind hosts have been so good as to invite us both during the intervals between our sessions and after their close. And the natural conditions of the United States are so varied that not only the Russian engineers, but also those of other lands have had and will have again a chance to observe interesting and highly instructive analogies between the navigable system of the United States and the systems of navigable highways of their respective countries.

Consequently, I am convinced that I utter the unanimous sentiments of the foreign delegates when I offer to our Chairman and to the American members of the first Section of the Congress our best thanks for the warm reception which we have had at their hands, and for the cordial and eloquent words which our distinguished Chairman has just spoken. (*Lively applause.*)

Mr. Cermelmann (in German). — Mr. de Hoerschelmann has just addressed, in the name of the various nations, sincere words of thanks, first to our esteemed Chairman of the First Section and then to the Americans who have organized this Congress without equal. If, as a German, I desire strongly to add still another word, it is because a warm feeling of the heart incites me thereto. Gentlemen, the Congresses of Navigation are an institution which must work toward the great cause of peace; their tendency is to develop the “blue ribbon” of navigable highways, to make known the legislation of the different lands and to bring closer the relations between the peoples. Gentlemen, water makes communications and not barriers, and this beautiful maxim, which is that of the Congresses of Navigation, has still another aim. If people be brought together in their communications and their commercial relations, they approach each other in their ideas. Finally, they agree with and understand each other; and one of the greatest successes of these Congresses is, to my mind, to teach the peoples to know each other. Strong in this thought, I propose three cheers for our Chairman. (*Lively applause.*)

The Chairman (in English). — Gentlemen, I thank you very much for your kind words and for the very sweet things the

speakers have said about me. I have been greatly assisted by my friend here, my associate President, Mr. Noble, and I have appreciated most deeply the devotion shown to the cause of the Navigation Congress by all who have been here and most of all by our foreign members.

I hope you have had a pleasant time in all respects, in addition to the very charming and profitable moments which we have had here, in the First Section.

In closing this last meeting of the First Section, I wish you all a pleasant stay while you are in the United States and a happy return to your homes.

The meeting adjourned at 12.15.

SECOND SECTION

(Ocean Navigation)

OFFICERS OF THE SECTION

Presidents :

Dr. E. L. CORTHELL, Civil Engineer, New York.

Colonel H. F. HODGES, Corps of Engineers, U. S. Army, Assistant
Chief Engineer, Isthmian Canal Commission, Culebra,
Canal Zone.

Vice-Presidents :

GERMANY

Wasserbaudirektor J. F. BUBENDEY, Geheimer Baurat, Hamburg.
Professor DE THIERRY, Geheimer Baurat, Berlin-Halensee.

AUSTRO-HUNGARY

HUNGARY

Technical Councillor POPP, in Fiume.

BELGIUM

H. VANDERVIN, Ingénieur en chef, Directeur des Ponts et Chaussées, Antwerp.

DENMARK

C. M. HUMMEL, Ingénieur en chef au Service des Travaux maritimes, Copenhagen.

UNITED STATES

C. E. PUTNAM, Commissioner of Lighthouses, Washington.

FRANCE

Inspector General CRAHAY DE FRANCHIMONT, Ponts et Chaussées, Paris.

DE PULLIGNY, Ingénieur en chef des Ponts et Chaussées, Chef de la Mission française aux Etats-Unis, New York.

ITALY

Professor L. LUIGGI, Inspecteur supérieur du Génie Civil, Roma.

NETHERLANDS

C. I. JOLLES, Ingénieur en chef Directeur du Waterstaat, Arnhem.

RUSSIA

Councillor of State DE ROUMMEL, Ingénieur des voies de Communication, Directeur des Travaux maritimes des ports de Riga, Réval, Pernau, etc., Riga.

General Major DE SCHOKALSKY, Professeur à l'Académie Navale, St. Petersburg.

SWEDEN

J. O. GRONWALL, Ingénieur, chef du Bureau des Phares, Stockholm.

Secretaries :

GERMANY

Dr. APELT, Bremen.

Professor F. W. OTTO SCHULZE, Danzig-Langfuhr.

BELGIUM

L. DESCANS, Ingénieur des Ponts et Chaussées, Antwerp.

FRANCE

P. BARRILLON, Ingénieur des Ponts et Chaussées, Bordeaux.

ITALY

Captain PH. DONDONA, Italian Navy, Pittsburgh.

RUSSIA

V. M. TRENIUKHINN, Ingénieur des Voies de Communication, Adjoint au Directeur des Voies navigables de la région de Kief.
WODARSKY, Ingénieur des Voies de Communication, Chef adjoint du Service technique de l'Administration des Voies navigables et des Routes, St. Petersburg.

SECOND SECTION

(Ocean Navigation)

FIRST SESSION

Thursday afternoon, May 23, 1912

Mr. CORTHELL in the chair.

The meeting was called to order at 2.30.

The Chairman. — Gentlemen, I see assembled here many delegates whom I have already had the pleasure of meeting at other Congresses, especially at Brussels in 1898, at Paris in 1900, at Düsseldorf in 1902, at Milan in 1905, and who, doubtless, took part also at the Congress of Saint-Petersburg, in 1908, at which I was unable to be present. This is the observation of a fact which shows, on their part, a firm and well defined intention to contribute always to the deliberations of this Section. Allow me, Gentlemen, in the name of the Committee on Organization and in my own, to offer you my very sincere thanks and also to extend the hand of welcome to all those who are attending our meetings for the first time.

In order to encourage you in persevering in your labors, I need only consult my own experience which extends not only to Europe but also to South America, and particularly to the Argentine Republic and to Brazil. I can assure you—and I speak that which I do know—that the words which you have heard uttered in the course of the labors of our Congresses, the articles and general reports which are periodically presented, have a great influence on the arrangements and measures adopted by various countries for carrying out their great works. I can tell you—and Commander Luiggi here present who was with me in Argentina will confirm what I say—that we, standing on the results obtained by our

Congresses, found in that country the solutions for several important questions concerning the size of entrance channels, extent of docks, etc... both for the installations along the Coast and for those in the interior of the country, and that the consequence of these solutions was the deepening of channels and the lengthening and widening of docks. I consider that we ought to find in this success for our labors an encouragement for following up our self-imposed task in the interest of the entire world.

I will remind you that about sixty articles relating to various questions have been collected and referred to this section. These questions bear upon the means for repairing ships, the dimensions of maritime canals, the equipment of ports, dredging, the statement of all the great works carried on at the principal sea ports during the past four years, including applications of reinforced concrete, the study of bridges, ferry bridges and tunnels where waterways used for ocean navigation exist and, finally, the lighting and marking of channels.

As President of this Section, I propose to follow in our deliberations the order adopted at former Congresses, which, if I be not mistaken, is as follows. First, the conclusions of the general reporters will be read in the three languages; then they will be taken up, paragraph by paragraph, for discussion and amendment; finally, after the wording of the different paragraphs shall have been settled, the conclusions will be read as a whole and put to the vote. (*Agreed to.*)

The Chairman. — As the Section agrees to follow this course of procedure, we will begin with the first question which relates to the

Means for docking and repairing vessels.

It has been treated by Messrs. Mönch, v. Klitzing and Hedde (Germany); Mr. Descans (Belgium); Mr. Donald (United States); Mr. Guiffart (France); Mr. Box (Great Britain); Mr. Egan (Hungary); Mr. Luiggi (Italy), and Mr. Nobel (The Netherlands).

Admiral Endicott, General Reporter on the question, read the

conclusions in English and asked Mr. Luiggi to have the kindness to read them in the other two languages of the Congresses.

These conclusions were given as follows :

" There can be no doubt that the type (whether dry dock or floating dock) to be adopted at a given place should only be decided on after a very careful examination of the conditions existing at the point. There may be at the site some special feature which would interfere with the construction or operations of one or the other type; or certain conditions may so greatly affect the cost that this alone should be considered in the solution of the problem; but most engineers and maritime experts have a very clearly defined opinion as to the value of the two types and the preference to be shown for either when both are possible. If there be any one point which the Congress should decide, I consider that it is this : When it is possible to obtain it, which type best answers the needs of commerce for the repairs of sea-going vessels, to be made under good conditions of safety and economy?"

" It is perfectly credible that the Congress would be able to reach a formal conclusion on this subject; such a conclusion would be useful and there is good reason why it should be sought.

" Most of the opinions expressed in the reports examined favor the dry dock. The study of all these reports, favorable and unfavorable, tend to confirm the opinion which the General Reporter formed for himself, in the course of a long experience and after having followed up the question for years, that dry docks offer the maximum of safety, convenience and economy for the repairs of sea-going vessels. "

The Chairman. — This last chapter of the general report contains two distinct parts : the statement of the reasons which led the General Reporter to these general conclusions, and the conclusions themselves.

If it be your wish, the motives invoked will first be examined. For this purpose, the reporters from the various countries will now be heard. Mr. Hedde, delegate from Germany, is among these reporters, so I shall give him the floor.

Mr. Hedde (in German) pointed out that, for probably the first time, the rather difficult attempt was made in the "Mönch" report to bring forward a comparative general study of the cost of the two systems of docking apparatus now under consideration.

The author of this study had to make some special hypotheses for this purpose. But, aside from the examination of the expenditures made under these conditions, there are also other points of view which should be looked into carefully in order to determine the relative values of dry docks and floating docks, but to which it is scarcely possible to give any numerical value; for example : *the question of utilizing later the ground space* intended for a work of the kind and the *possibility of modifying or enlarging the plant*. " In this connection, I recall," said Mr. Hedde, "that the Secretary of the Navy of the United States gave the preference, in a certain case, to a floating dock, in view of the faculty of being moved possessed by such an apparatus and the facility with which it could be adapted to future conditions. The final conclusion of the General Reporter, which, in a general way, gives the preference to dry docks, even on the score of economy, should therefore be amended. "

The Chairman. — Mr. Descans has the floor.

M. Descans (in French) pointed out that the portion of the general report relating to the article which he had presented did not translate exactly his views. He wished to show that, when a masonry dry dock is under construction, *it were well to build the side walls before putting in the masonry floor*. The general report states, on the contrary, that the floor should be finished before putting up the side walls, which contradicts the developments and conclusions of the report.

Except on this point, Mr. Descans said that he agreed with the General Reporter.

The Chairman. — Mr. Donald has the floor.

Mr. Donald. — I have nothing to say in regard to the conclusions of the General Reporter.

The Chairman called on Mr. Ducrocq.

Mr. Ducrocq (in French) gave a summary of the report of Mr. Guiffart, who had been for ten years his assistant at Havre and who had not been able to come to the Congress.

The last part of the report was given up *to the large dry dock*, 312 metres in clear length and 38 metres wide in the clear at the entrance, *now in course of construction at Havre*.

The contract for building this dock was made as the result of a *competition* in which all French and foreign constructors could take part. At the same time that many proposals were presented for building a dry dock, one offer was made for installing a floating dock. This allowed Mr. Guiffart to make an exact comparison in the use of the dry dock and in that of the floating dock, so far at least as the port of Havre was concerned.

There are cases when only the floating dock is possible, the construction of the dry dock being out of the question or altogether too expensive. There are others again, it is true, where the use of the floating dock offers special advantages of a sort to make it preferable to the dry dock. But sight must not be lost of the advantages which the latter offers, in a general way, for cleaning the bottoms of large ships.

The floating dock can be put into service more quickly and at less cost when there are no special works to be built or expenditures to be met with a special view to its installation at the port, and when there are at hand a sufficient area and depth of water. *This was not the case at Havre*. The length of time required and the first cost were practically the same for the floating dock and the dry dock, on account of the necessity of preparing a special slip in which to place the former.

Furthermore, very difficult and costly dredging would have been necessary in order to preserve at the site of the floating dock the great expected depth, 18 mètres, below low tide, which still left a clearance of only 0.40 m. below the bottom of the dock.

Finally, the weight of steel entering into the construction of the floating dock would have been not less than 22,000 tons and the maintenance of such a quantity of metal would have involved very great expenditures. The time for the work would not have been

reduced. These are *two difficulties* which, in a general way, are inherent to the use of floating docks for cleaning the bottoms of large ships.

Mr. Ducrocq noted, in ending, that the General Reporter had expressed sensibly the same opinion as did Mr. Guiffart; he also adopts their common point of view.

The Chairman. — Mr. Luigi has the floor.

Mr. Luigi (in French). — I approve fully the conclusions of the General Reporter. My experience is founded on the construction and study of many dry docks and of several floating docks.

Floating docks do very well in ports where the water is very deep and very quiet, or where the bottom is very bad, or yet in the case where there is a great hurry in getting a dock, as is demanded sometimes by the necessities of the navy.

In other cases, all else being equal, masonry dry docks are better and safer.

In particular, work on ships can be performed there under better conditions. This advantage is important at the present time, *in view of the development of turbine ships*. The axes of the turbines can be laid and adjusted easily when the vessel is resting on the fixed supports of a dry dock; the conditions for these operations are, on the contrary, very unfavorable when the ship is in a floating dock and, undoubtedly, can only be successful in still water; consequently, I am wholly in accord with the conclusions of the General Reporter.

The Chairman. — Mr. Treniukhinn has the floor.

Mr. Treniukhinn (in French). — I am very sorry that my report, in which I rather take the side of floating docks, was not analyzed in the general report. I think that the choice to be made between dry docks and floating docks depends upon local conditions. There are cases when it is better to build dry docks, but there are also many cases in which floating docks only can be used.

I think that there is a misunderstanding in the discussion, for several speakers, while speaking decidedly in favor of dry docks,

admit, nevertheless, that there are cases for which the best solution can be given by floating docks.

The Chairman. — General de Schokalsky has the floor.

General de Schokalsky (in French) also thought that there was a misunderstanding between the conclusions given by the General Reporter and the opinions which several members of the Section had just expressed on this question in order to support the said conclusions. These, in the opinion of the Russian delegates, are much too categorical and cannot be accepted as offered.

General de Schokalsky thought that even the members of the Section who had just spoken, could not really accept, without any reserve, Admiral Endicott's views.

Be that as it may, the Russian delegates and members present at the session asked that the preference which the General Reporter gave too formally to dry docks be not adopted in this form by the Congress.

The Chairman. — Mr. Schulze has the floor.

Mr. Schulze (in German) considered that the conclusion proposed by the General Reporter was, in the form presented, too much in favor of dry docks. The advantages and disadvantages of both floating docks and dry docks should be analyzed in each particular case.

Floating docks are more rapidly and economically built; they can be moved from place to place. But they are more expensive to keep up than are dry docks and they less accessible for materials which have to be brought to the work. As the result of deposits of mud and sand, the draught of water at the site of the dock can often be maintained only by means of regular and quite large expenditures. The installation of the dock should be sheltered.

As for *dry docks*, the cost of construction is large, the works extend over much time, the foundations are difficult to put in and the works for holding back the water are, more frequently than not, very costly. On the other hand, dry docks are long lived and need very little in the way of repairs; the necessary materials for repairs can be readily brought to them.

Hence, the resolution to be adopted should be so worded that, when the system is to be chosen, the special conditions of construction should be taken into account, attention being paid to the points of view specified above.

The Chairman. — Mr. Jollès has the floor.

Mr. Jollès (in French) called attention to the fact that the Netherlands reporter, Mr. Nobel, who was not present, finished his report with conclusions other than those of the General Reporter. Mr. Nobel did not declare in favor of either of the two systems; he considered that the choice to be made between the dry dock and the floating dock should depend on a study to be made in each particular case.

A few years ago, said M. Jollès, there was built in Holland a dry dock which was the cause of great deceptions. Afterwards, there were built several floating docks of which the descriptions had been presented by Mr. Nobel to the Congress of Dusseldorf. This Congress adopted conclusions which were less formal and better than those which the General Reporter now brought in and which Mr. Luigi supported. These last are too much in favor of dry docks; the Congress should rather adopt the conclusions presented by Mr. Nobel.

The Chairman. — Mr. Luigi has the floor.

Mr. Luigi (in French) stated, in reply to Mr. Jollès's observations, that there are cases in which recourse can be had only to floating docks; for example : at Valparaiso, where the water in spots is as much as 30 metres deep; or in the German and Dutch ports where the bottom is muddy and very bad; or again when, for military reasons, the matter is one of great urgency. In the other general cases, the preference should be given to the dry dock.

The Chairman. — Mr. de Joly has the floor.

Mr. de Joly (in French). — Attention must be called to the fact that a part of the apparent disagreements which have arisen

between the different speakers arise from typographical differences which exist between the French and English editions of the general report. The first paragraph, printed in italics, of the English edition contains considerations in favor of floating docks which are similar to those put forth by Mr. Luiggi and of a character to reconcile all opinions.

These last are really not very far apart and it seems easy to prepare a form which, properly worded in the three languages of the Congress, could be voted unanimously.

The Chairman. — Do you desire to make any proposition?

Mr. de Joly. — Yes, I ask for a wording which will satisfy everyone; but this wording cannot be improvised during the course of a session, so I propose that its preparation be intrusted to a Committee composed of the principal speakers from the various countries which have taken part in the discussion.

The Chairman. — Mr. Vanderlinden has the floor.

Mr. Vanderlinden (in French). — Allow me to express my opinion on the question just now under discussion.

It seems to me that the dry dock is, in all evidence, the best solution of the problem of cleaning ships' bottoms, whereas the floating dock can only be justified in special cases and should be regarded as a solution adopted for lack of a better.

In order to justify this view of the matter, it will be enough for me to compare, from sundry positions, the two systems placed before us :

1° In the matter of *first cost*. — Floating docks can hardly be put on the same footing as dry docks.

The example of Havre is symptomatic on this point. The floor of the great dry dock, 320 metres long by 38 metres wide, now under construction at that port, had to be made 12 metres thick in order to reach firm ground, yet the estimated cost of this work amounted approximately to 25 million francs, the same as that of the project presented for a floating dock.

The dry dock at Bremerhaven, 255 metres long by 34.50 m wide, only cost about 9,560,000 francs.

On the other hand, the floating dock at Fiume, 75 metres long by 20 metres wide, gave rise to an expenditure of about 1,800,000 francs. I presume that, under ordinary conditions of foundations, a permanent dock of the same size could have been built for the same price.

Mr. Mönch and his associates also consider that the two systems are thoroughly comparable, under ordinary circumstances, in the matter of cost; the essential factor is the nature of the ground at the site of the work.

2° In the matter of *annual operating expenses*. — Mr. Mönch and his associates give some interesting information on this subject. For 20 operations a year, these expenses are 12.8 per cent less for the permanent dock than for the floating dock, while for 100 operations this figure is still 7.1 per cent. This comes, on the one hand, from the fact that it costs less to pump out the floating dock while, on the other hand, the cost for maintenance is heavier and that for labor is greater.

3° In the matter of *life*. This is unlimited for the dry dock which is normally kept in repair. It is 20 to 25 years for the floating dock and, according to Mr. Luiggi, in exceptional cases only 35 to 40 years.

M. Box estimates, in his report (p. 8) that a floating dock "can last as long as it need last," all the dry and floating docks built thirty years ago having become too small. This is, to me, rather a paradoxical conclusion; because, if the dry dock is kept in normal repair, it can continue at the end of 30 years to be used for ships of the size of those for which it was built, whereas the floating dock at the end of this time may have to give up its service by falling into decay. So far, then, as the life of the work is concerned, the advantage is, beyond peradventure, still on the side of the dry docks.

4° In the matter of *safety of operating*. — There is no, or almost no, danger with a dry dock, whereas a floating dock may upset. (See Mr. Box's report.)

Again, deformations of the floating dock may react on the ship through the keel, and longitudinal strains which are very hurtful to the vessel may be called into play.

Sectional floating docks seem, according to Mr. Treniukhinn, to

possess a certain elasticity, such as to prevent the injurious effects of longitudinal bending moments. I will, with Mr. Box, call attention to the fact that dividing the docks into sections can only be had to the detriment of the stiffness of the work. I may also add that Mr. Luiggi shows that the main shafts of ships may be bent.

Here again the advantage appears to be on the side of dry docks.

5° In the matter of *quickness of construction*. — The report of Mr. Mönch and his associates gives an interesting bit of information on this point, viz. that, since 1908, America, England and Germany have been building floating docks for taking battle ships out of water, in spite of the advantages mentioned above to the credit of dry docks.

How explain these decisions?

Is it because floating docks can be handled so quickly? (The 44,000-ton dock at Kiel can be lowered in 30 minutes and raised in two hours.)

Is it for the reason that the floating dock can be moved in time of war so as better to put it out of reach of a bombardment?

Or else, is it not rather on account of the very small amount of time required for building this sort of docking apparatus?

Without denying a certain value to the first two considerations, it is believed that, under the circumstances, the third was the absolutely determinant one.

The political atmosphere was not very serene in 1908 and it may be that the great maritime nations may have thought it most urgent to obtain the means for docking their big battle ships.

Floating docks have the advantage over dry docks from this point of view. A large dry dock, of which the foundations have to be put down by means of compressed air, may require six years for its construction (the construction at Antwerp of the Royers lock, $180 \times 22 \times 10$ metres, with three bays, founded by means of compressed air, lasted four years). A large metallic dock might be built in half the time.

Floating docks may also have to be adopted in cases where the subjacent soil is very bad or where space is lacking : as at Fiume.

But these are evidently exceptional cases. The statistics of existing docking plants has also its value. These plants in Great Britain include 240 permanent and 13 floating docks; there are

also 32 dry docks belonging to the State and two floating docks under construction.

Under these conditions, I believe, in spite of the great advance made in the construction and operating of floating docks (for example, observation of flexion to very nearly 1 millimetre), that I ought to submit to the Section the following conclusions :

" The use of permanent docking places gives, as a general rule, the most satisfactory solution of the problem of the cleaning of vessels' hulls.

" Still, by reason of the great advances which have been made of late years, both in their construction and mode of operating, floating docks form appliances which can be recommended for taking vessels out of water, especially :

" 1° When there is a major interest for being able to have docking apparatus at hand with the least delay;

" 2° For countries over seas where labor capable of building large masonry works cannot be had.

" Floating docks may even have to be adopted when the subjacent soil is too bad to receive the foundations of a masonry dry dock. "

The Chairman. — Mr. Perrier has the floor.

Mr. Perrier (in French) while agreeing, on the whole, with the opinion expressed by Mr. Vanderlinden, quoted an example in which the use of a floating dock was advantageous on account of the ease with which an apparatus of this sort could be moved.

It was a question of a floating dock of 3,000 tons lifting capacity which the Suez canal Company had had built, some eight years ago, for the repairs of its great floating appliances, dredges and other. The floating dock could be conveniently moored near the existing shops which it had been decided, in principle, to move. It is still in excellent condition and will be transferred soon to the ground occupied by the new shops now under construction at Port Saïd at the East of the maritime canal.

Mr. Perrier added that the local conditions did not admit the slightest hesitation in selecting a floating dock in preference to a dry dock.

Mr. Luigi (in French). — I also will mention a case where a floating dock was used with success. During the construction of a breakwater at Genoa, where the water was more than 24 metres deep, a large collier, by reason of clumsy handling, sank on a mass of rip-rap. A floating dock belonging to the work was sent out in calm weather and, by passing it under the hull of the ship, the latter was set afloat.

But these are exceptional circumstances unforeseen in the use of a floating dock, and the preference should be given, in the majority of cases, to the dry dock.

The Chairman. — Mr. Treniukhinn has the floor.

Mr. Treniukhinn (in French) thought that the Congress might take a stand which would yield unfortunate results, if it wished to specify all the cases in which floating docks are to be preferred to dry docks; furthermore it would be very difficult to enumerate them all.

In his opinion, dry docks and floating docks were of equal value, both technically and economically, and the choice to be made depended on local conditions.

He believed that there were no reasons for which the Congress should change, in favor of dry docks, the conclusions adopted at the Congress of Düsseldorf, especially in view of the great progress made in the construction of floating docks during late years.

The Chairmann (in English). — In conformity with Mr. de Joly's proposition" I think that it would be well, in order to clear up the question, to submit it to a sub-committee to be composed of Messrs. Donald, Ducrocq, Hedde, Luigi, Treniukhinn and Vanderlinden with Admiral Endicott as Chairman, this sub-committee to present its conclusions at our next session. (*Signs of assent.*)

The session adjourned at 4.30 p. m.

SECOND SECTION

(Ocean Navigation)

SECOND SESSION

Saturday morning, May 25, 1912.

Mr. CORTHELL in the chair.

The meeting was called to order at 9. 30.

The Chairman (in English). — Gentlemen, it was proposed at the end of our first session, day before yesterday, to appoint a sub-committee of seven members to consider the subject of the conclusions to be adopted for the first question, that of *docking apparatus*. This sub-committee met after the adjournment of the session and agreed upon a wording which Mr. de Thierry will please read.

Mr. de Thierry. — The conclusions adopted by the sub-committee are as follows :

Graving docks constitute, in general, the most satisfactory solution of the problem of docking large vessels; but there are cases where floating docks only could be adopted, and others where they offer special advantages that give them the preference.

(These conclusions were read in the three languages).

The Chairman (in English). — Are there any objections offered? I hear none. The conclusions are carried.

The Chairman (in English). — The first section has this morning under discussion a question which relates to canals and

which is quite like the second question of our programme, except that it refers to inland navigation. Several delegates who are present at that meeting wish to be here when the like subject shall be treated in our Section. In order to allow them to do this, the third question will now be taken up, and the second question will lie over until our session this afternoon.

The *third question*, which is to take up our time this morning, is thus worded :

Mechanical Equipment of Ports

Reports relating to this question were laid before Congress by Mr. Bubendey (Germany), Mr. Hodgdon (United States), Mr. Barrillon (France), Mr. Barling (Great Britain), Mr. Wouter-Cool (Netherlands), Mr. Spalving (Russia) and Mr. Hermann (Tunisia).

The report of Mr. Bensel, General Reporter, contains no conclusions to be discussed or to call for a vote, but this report may itself be analyzed and offer occasion for remarks relative to this same subject.

Mr. Harding has the floor.

Mr. Harding (in English). — In the address of General W. H. Bixby, Chief of Engineers of the United States Army, before the first Section on Thursday, Gen. Bixby, among his eloquent and eminently practical common-sense remarks, laid emphasis on the fact that exhaustive commercial investigations should precede the engineering. In reference to terminals this is especially true.

A few years since a number of letters, several hundred, were sent to the executives, engineers, and operating superintendents of ocean, river and railway transportation companies in the United States, to ascertain the necessity for machinery for transferring miscellaneous or package freight or cargoes, at their various terminals, and also what functions this machinery should be able to fulfil.

Among the numerous answers, and, in some cases, the executives had sent copies of the letter of inquiry to their terminal superintendents, and then forwarded the full answers to the

undersigned, the replies were unanimous as to the necessity for such machinery.

The functions, which, the replies demanded, must be effected by any such machinery, were many and varied.

Combining the conclusions of these letters with personal experience and observation, the essentials, for which provision must be made, were condensed into three important principles, with many other subordinate requirements. These were :

First. That the machinery should be able to serve every cubic foot of space; that is : at the terminals.

Second. That this service should be without rehandling by manual labor.

Third. That there should be continuous rapidity.

Conclusions. The ideal situation generally should be for a well equipped terminal.

By the first is signified that the machinery itself must raise and lower packages of every size and description, from a small box to a piano, or an irregular casting to a long pipe-casting from any space on the floor or surfaces and transfer it to any other space.

This should include tiering, that it should be possible to tier at least twenty feet in height. On piers, the average height of tiering is about five feet, and to tier ten feet by hand might add ten cents to the cost of handling, and to tier fifteen or twenty feet much more proportionately.

To be able to tier fifteen feet instead of five feet would increase the pier capacity three times. To illustrate the meaning of the foregoing, reference may be made to the overhead crane as used in all machine shops, travelling upon and between two parallel rails.

This crane will raise and lower loads, including tiering, anywhere within its range, that is : within the pier shed, not requiring any floor space to be reserved for surface conveying, able to pass above any obstructions and utilizing unoccupied overhead space.

Any such crane however fails in giving continuous rapidity, although it requires no rehandling at the beginning or at the end of the movement.

While the crane, or even cranes, may be hoisting and conveying the loads, then the man employed in the first handling or in attaching freight to the rope hooks must be idle, wasting during the day many labor hours, besides producing congestion, and congestion is often only another name for rehandling.

Arrangements should therefore be provided for one load to follow another, hoisting and conveying, so as to give a series of continuous movements.

Not only this alone, but provision should also be made for all the customary operations prevailing at terminals, among which may be mentioned scribing, inspecting, assorting, distributing, weighing or measuring, routing, checking and rechecking, and for the movements whereby the inbound differs from the outbound.

It should be possible to convey, while separated, the consignments as per the marks or crossmarks, and to have conveyed weighing or measuring, routing, checking and rechecking, and to secure a load of about 3,000lbs. From the average weight of consignments at American ports this is possible.

Rehandling by manual labor is expensive, generally adding at least fifty per cent to the original cost of handling, and often one hundred per cent.

There is signified by a modern terminal for water-borne freight in this country, as has been fully explained by the Hon. Herbert Knox Smith, Commissioner of Corporations of the United States, in his most excellent report on terminals, piers, pier sheds, bulkheads and sheds or quays and quay sheds, railway tracks and platforms, dray areas and platforms, warehouses and open yard spaces.

All of these terminal elements should be connected or coordinated by machinery, so that according to the three principles above mentioned, miscellaneous freight or cargoes can be transferred either to or from the ships, serving all space by the machinery, rapidly and economically.

It has been demonstrated by many plants, especially in Germany, that all of the above conditions can be most successfully fulfilled.

The actual cost of hoisting from the ships' hold by the winch, or by the usual travelling gantry crane, may be less than three

cents per ton, but the after-expense on the pier, including the distributing and assorting, is often thirty cents. The fall-rope of the ship's winch serves only the space upon the pier's side, possibly ten feet from the edge, while the gantry may extend this distance from ten feet to forty feet, but only on an open pier.

By means of overhead transference tracks, being in the form of loops when extending out over the water, these loops having horizontal and vertical movements, and a combination of fixed and movable tracks when space is to be served, and all traversed by transfer trains each composed of transfer-tractor and a number of trailer-hoists, all the usual freight movements can be effected.

That is, a large tonnage can be directly transferred between the pier, bulkhead, cars, dray platforms, warehouses and yards with rapidity and economy.

Whatever machinery however may be employed, the three conditions of space-serving, no manual re-handling and long-distance continuous rapidity are the conditions which should be fulfilled to satisfy the engineers of our inland and seaport terminals.

The Chairman. — Mr. Rogers has the floor.

Mr. Rogers (in english). — The mechanical equipments of ports has two functions to perform viz: to lessen the friction incident to breaking of bulk, change to other types of carriers and the rest in warehouses between transfers; to improve the dispatch, the essence of all commercial transactions, and a valuable asset to a port.

There are two classes of work in a large terminal that cause friction (expense) and hamper quick dispatch viz; that tremendous amount of internal traffic beyond the economical range of the handtruck and insufficient in distance and quantity to warrant std. gauge freight car traffic; and the great number of widely distributed lifting jobs where heavy packages are put on cars or removed from same, high tiering and its converse, too widely scattered and insufficient per location to warrant permanent cranes.

To perform these functions economically and expeditiously, the Bush Terminal Co. in New York has installed a number of Battery Imck Cranes which are both lifting and towing machines.

By towing trailers loaded with goods, one machine can move 600,000 lbs of cotton one half mile in ten hours ; on small packages, one machine has moved 1,000,000 boxes of canned salmon 600 ft in nineteen hours. As used for crane work one machine has loaded 63,800 bbls of plumbago into a car in twenty five minutes, and, in lifting and carrying on the hook, three hundred bbls of plumbago were conveyed three hundred feet and lowered into a basement in five hours. Three hundred and sixty heavy castings were removed from a gondola car in five hours.

The members of the Congress whom this question interests and who are going to New York next week, will doubtless see the plant of the Bush Terminal Co. which, in the opinion of Calvin Tomkins, is the only complete and broadly conceived terminal plant in the United States. The equipment used by this Company deserves a careful examination.

The Chairman (in english). — A propos of what Mr. Rogers has just said, I desire to state that the New York Dock Department, as you will doubtless have noticed in consulting the programme of excursions, has placed at our disposal one of the large new ferry boats which can carry 1,200 passengers. This boat, will take us to visit the "Bush terminal" and many other interesting places of the port, from 10 o'clock in the morning to 4 o'clock in the afternoon.

Mr. Cresson, first assistant to Mr. Tomkins of the Dock Department, has just handed me a programme. You will see everywhere piers on both sides of the East River, down the river as far as Bush terminal, and up the river as far as it is interesting to go. I am sure that you will all have a useful and interesting trip that day.

I wish now to introduce to you Mr. John Kennedy of Montreal. I will introduce him to you as an Engineer, a gentleman, a member of the American Society of Civil Engineers and Canadian Society of Engineers. He has built up that splendid port of Montreal which some of you will see on visiting Canada. While he has retired from active life, every word he says to you will have weight. I am very glad he is here to speak to us.

Mr. Kennedy (in English).

Mr. Chairman and Gentlemen :

I desire to add to what has been said regarding New York, that the port of Montreal presents features of interest with respect to the handling of goods, and the Members of the Congress who take the trip through Canada from Sault Ste. Marie by way of Lake Ontario and the St. Lawrence to Montreal, may find interest in looking over that port. The harbor is unique as belonging entirely to the Government of Canada and being administered by a Board of Commissioners entirely in the public interest. There are no private wharves or other port equipments, but all is publicly owned. The railway tracks upon the wharves also are part of the equipment and all railway companies have access through those tracks to any ship by merely handing over their cars to the Commissioner's Railway Service, by which the cars are deposited alongside the steamship sheds or alongside the ship itself if so desired. The steamship sheds on the newer wharves are two stories in height the lower floor being made level with the car floors and therefore convenient for the handling of freight. Both floors are accessible to drays. The lower floor by direct access and the upper floor by means of large platform elevators, which hoist or lower the drays between the lower and the upper levels. The trade of Montreal comprises practically everything usually handled in seaports, that is : exports and imports, through traffic and local traffic, export of grain and large passenger traffic. The harbor is therefore equipped for all sorts of services and will present points of interest to all who care to visit it by taking the Canadian trip.

The Chairman. — Mr. Titcomb has the floor.

Mr. Titcomb (in English). — Car tipples in America, for handling cargo coal from cars to vessels, are rapidly increasing in size and capacity. 30 machines installed by the McMyler Interstate Co, now in operation on the Great Lakes and Atlantic Coast, will unload cars carrying 55 tons of coal. Five machines will handle cars carrying 75 tons of coal. Machines are now in course of con-

struction on the port of Philadelphia and elsewhere designed to handle cars carrying 100 tons of coal. One of these machines at the port of South Amboy, N. J. has made the following records.

1. One complete cycle in 45 seconds;
2. Sixty cars in one hour;
3. Two hundred and sixty-two cars, or approximately 10,000 tons, into 26 barges, in 100 hours;
4. Two machines at this port handled 4,500,000 tons of anthracite and bituminous coal in the year 1911.

This last represents about three times the amount of coal handled annually at the port of Rotterdam.

The coal is discharged from the car by rotating it through an angle of 135° around an axis parallel with the side of the car. The coal is delivered to the vessel through a power-operated telescopic chute. It has been found economical to operate these machines by steam in most instances.

For unloading ore from vessels on the Atlantic Seaboard, machines equipped with buckets carrying five tons are in operation. Each machine unloads from 200 to 400 tons of ore per hour depending upon the specific gravity of the ore and the character of the vessel.

On the Great Lakes, machines equipped with buckets carrying fifteen tons of ore are common and unload from 400 to 800 tons per hour. For discharging coal from vessels, special cranes and transporters are used. At the port of Portland, Me., two McMyler machines equipped with buckets carrying one and one half tons of coal have completely unloaded a cargo steamer carrying 6,500 tons of bituminous coal in 17 hours. Under favorable conditions round trips at the rate of six per minute have been made. The average capacity being from two to four trips per minute. On the Great Lakes, at the port of Duluth, bridge tramways are used for unloading and storing coal from vessels. These machines are from 300 to 500 ft. long and are equipped with buckets carrying five tons. Each machine unloads from 200 to 300 tons per hour. They are electrically operated and consume about 1 K. W. hour of current per ton of coal handled.

The self filling grat buckets referred to weigh from one to one-and-one half times their rated capacity.

The Chairman. — Mr. Coleman has the floor.

Mr. Coleman (in English). — Mr. Chairman and Gentlemen, the port of New Orleans for which I am Consulting Engineer has been making a very serious study of these questions, which are under discussion by this section. Our conditions are exceedingly peculiar in comparison with other ports of the world. We are unable, by reason of our river conditions, to build piers and we are forced to make use of wharves which are parallel with the axis of the stream, and which lie at distances varying from 75 to 100 ft. from the bulkhead. We build steel sheds. We have no mechanical appliances for the handling of general freight, with the sole exception of moving platforms, some of them portable, which have given fair results.

We have a public railroad which serves every wharf and from which tracks enter into the sheds, usually in the rear of the docks proper, so that cars may be placed within, certainly, not more than 150 feet from the front line of the docks. We have found that the question of mechanical equipment for the port can not be solved, in our peculiar conditions, by the same means which seem to have been successful in some European ports, notably that of Hamburg. We find also that, for the particular classes of cargo which we have to handle most, it will be necessary to provide a special equipment. I have recently been charged with the duty of making a special study, in behalf of the Port Commissioners, of the question of handling cotton and I have designed a warehouse and terminal system on which I submitted the report to the Port Commissioners but a few days ago. In brief, this project includes the construction of a number of units in the shape of warehouses, each of which will be 600 ft. long and 8 stories high. These warehouses, of which my plan showed, tentatively, six, are to form the central features of an extensive railroad yard, carrying some fifteen to eighteen miles of track, and are to be in the rear of and distant not more than 500 ft. from the dock, which dock would be specially assigned to the cotton handling trade. At each end of the railroad we would have cotton compresses, to provide the means by which no uncompressed cotton would be left on the warehouses. The lower floor of the warehouses would be built at such elevation

as to be level with the floors of the cars. Two special tracks would be provided on each side of the warehouse, so that freight and cotton might be handled from two tracks simultaneously. The lower floor would be wholly unimpeded by partitions and, in fact, would contain nothing except cars. The upper floors, for insurance reasons, would be divided into compartments 100 ft. x 100 feet, this dimension being the width of the building. On each side of the tiers of this compartment, it is proposed to install endless chain elevators of the type familiar in coopeage plants, with projecting arms at frequent intervals into which the Cotton bales may be dumped, and made to drop automatically at the desired floors. The compartments being so small, 100 ft. wide x 100 ft. long and the height of each story being 15 ft., elevators will be provided on each side of them, as it is not regarded as economical to consider any other means of handling the cotton within the compartment than that by hand trucks and tiering machines, to tier the cotton five high. This would take up all the vertical space, except what was needed for actual working. We put one bale on top of another.

When the cotton is ready for shipment it would be turned out by hand trucks and loaded on the conveyors by which the bales would be carried to the eighth floor, which, by reason of the peculiar conditions of the cotton business, would be enclosed, roof and sides, with glass, so as to supply ample light for weighing inspecting and classifying the cotton. The eighth floor would contain no compartments, but would be the full size of the building.

It is proposed to install a gravity trolley in the centre and suspended it from the roof of the eighth floor. The bales when ready for delivery to the ship will be attached to the gravity trolley and be carried by gravity, through suitable overhead trackage and along the dock, immediately to the side of the particular vessel in which the cotton is to be transported.

The shed of this cotton dock will be somewhat different from those which have been used heretofore in New Orleans. It will be two stories in height and the trolleys will deliver the cotton to the second story, whence, at the ordinary stage of the river, the cotton will be sent down by skidways in order to avoid manual labor.

The cotton which is shipped in transit, which does not stay in the warehouses and which remains in New Orleans only for the time necessary for its transshipment from the car to the ship, will be handled by means of loading cranes, of a type much used in the United States. These cranes will take the cotton at the doors of cars brought in on a track which lies along the water side of the sheds, and will lower it into the ships.

All the machinery in the plant proposed would be driven electrically.

In order further to extend and to make more elastic the arrangement which it is proposed to install, it is intended to make use of a storage battery truck like those employed at the Erie pier in New York.

The Warehouses are to be built of reinforced concrete and to be generously provided with water mains, sprinkler systems and other devices of the highest order for preventing and extinguishing fires. All openings and doors are to be of steel and of wire glass and every practical device known will be brought into use.

The Chairman. — Mr. Bubendey has the floor.

Mr. Bubendey (in German). — Many and remarkable reports in relation to the equipment of ports have been laid before the Congress; furthermore, our American colleagues have been so kind as to give again to-day a whole series of new and interesting information. I propose to the Section that our thanks be expressed for the communications made and that *any desire to lay conclusions before the meeting be given up. The conditions under which the operations of loading or unloading have to be carried on in ports differ so much that general rules cannot be laid down.*

At Hamburg, bulk goods (such as corn, wheat and grain) are generally transhipped directly from ocean-going vessels to river boats. The quays are used mainly for the movement of general freight. The question is, therefore, one of discharging the sea-going ships as quickly as possible, of putting the freight in order in the sheds and then of transporting this freight, by rail or water, either to the Upper Elbe or to the warehouses in the city. As the cranes have booms by which their reach can be adjusted, it is

possible to have three swinging cranes at work at the same hatch of a ship.

The Chairman. — Mr. Matheusche has the floor.

Mr. Matheusche (in German). — The communications of the Reporters are most important and interesting, in view of the fact that the question of mechanical plants for loading and discharging ships is becoming more and more serious in the presence of the constant increase of wages, of tonnage and of the capital represented by the net cost of the vessels. But the various reporters tell only what are the real conditions which exist in the different ports without making any comparisons as to the various systems of equipment in use, and yet such a comparison would have its use in the matter of general cargoes. *I propose, therefore, to take up, for the next Congress, a comparison of the two following systems for handling freight :*

1°) *derricks and loading bridges;*

2°) *carrying belts;*

bringing out the advantages offered by each of these systems under the local conditions and according to the kinds of freight. This would surely be of great service for the commerce of the world.

The Chairman. — Mr. Barrillon has the floor.

Mr. Barrillon (in French). — Most of the American engineers who have treated the question of the mechanical equipment of ports *have spoken almost solely of the mechanical handling of freight in bulk*, and the information which they have supplied on this part of the question is, it is needless to say, most interesting. On the other hand, *they seem to have neglected the mechanical handling of "package freight."* The General Reporter appears even to consider the placing of derricks for this freight as a luxury (1st sentence of page 2 of the French translation of the report : Les administrations., etc.).

We believe that it should be remarked on this subject : 1°) that while it is difficult *it is not impossible* to balance the budget of a

public service of derricks for package freight without forgetting the sinking fund; 2°) furthermore, in order properly to appreciate the profits of such a service, the saving obtained on the length of the quays required to handle a given traffic should be taken into account.

Again, the conditions under which the package freight should be handled are sufficiently different from those which exist in handling bulk freight for the same principles not to be applicable immediately to both cases. This is why a few reservations should be made in regard to the conclusions of the very remarkable statement of Mr. Harding: Absence of all rehandling cannot be realized, it seems, for package freight in our ports; this freight goes to different consignees and should be easily recognized, hence it must be deposited a first time and often spread out not far from the ship.

In like manner, it does not appear to be indispensable in the case of package freight to occupy every *square foot* offered for deposits; we believe that it is enough that every *square foot* on a part of the adjacent ground be suitably occupied. It is rare that package freight is piled up in the sheds, properly so called, this operation can scarcely be carried on except at the warehouses.

I shall mention only one example in support of the preceding remarks and—as we have just gathered information of the highest order on the handling of cotton at its shipping port—say a few words about the handling of cotton at one of its principal ports of entry. The Chamber of Commerce at Havre took the necessary steps to have the bales of cotton—not piled up—but spread out, on the contrary, and this is why it caused to be built on the Quai de Garonne a shed 114 metres wide.

The Chairman (in English). — After the sundry considerations which have been put forth in connection with the question before us, I think that it would be well to appoint a sub-committee to prepare the resolution to submit to the Congress. (*Assent*). But, let me say to you first that, judging by my personal experience, the question of the reduction of the cost of handling freight is one of extreme importance for the whole world.

Consulting Engineer, in 1902, for the Argentine Republic,

I sent two of my young engineers to Europe to study the processes there in use, by means of electric, steam or hydraulic derricks, for handling freight of various sorts and to report on the system best suited to the needs of that country. *They saw one method applied in London, a second at Hamburg, and found elsewhere still other processes in use. The system varied from port to port.*

Five years after, in 1907, there was held at London an important Technical Conference which had this question in its order of business, but it was not fully discussed or developed, and I consider that the International Association of Congresses of Navigation is better qualified and equipped to study the subject in all its details. So we might ask that *the question of the Mechanical Equipment of Ports be left on the programme of the next Congress*, so as to discuss the different systems of handling which lend themselves best to conditions which vary from one place to another and with the briskness of trade. It should be possible in three years to reach a result which would be useful to the world for its commercial transactions.

I shall name, as members of the sub-committee which is to submit this afternoon a draft of a resolution : Messrs. Barrillon, Batard-Razelière, Bubendey, Coleman, Matheusche, and Mr. Harding as Chairman.

So, we shall leave now and meet again at 2 P. M.

The meeting adjourned at 11.45.

SECOND SECTION

(Ocean Navigation)

THIRD SESSION

Saturday afternoon, May 25, 1912.

Mr. CORTHELL in the chair.

The meeting was called to order at 2 o'clock.

The Chairman (in English). — Gentlemen, the sub-committee appointed by the Chair, at the end of our last meeting, to present a draft of a resolution on the subject of the Mechanical Equipment of Ports, has handed in a resolution to which all the members agreed. Mr. de Thierry will please read the resolution.

Mr. de Thierry read the following resolution prepared by the sub-Committee :

"The sub-Committee proposes to continue the following question on the programme of the next Congress :

Mechanical transferring of miscellaneous cargoes from the vessel's hold or from the vessel's deck or from the pier's side to all areas embraced within the terminal limits.

The resolution was voted unanimously.

The Chairman. — The **second question** on the programme of our Section will now be taken up, it is worded as follows :

Dimensions to be given to maritime canals. (Technical point of view. Probable dimensions of the sea-going vessels of the future.)

This question was treated, in reports laid before the Congress, by Messrs. de Thierry (Germany), Van der Vin (Belgium), Corthell (United States), Foster King (Great Britain), Leemans (Netherlands) and Zamjatin (Russia).

The Chairman. — The General Reporter, Mr. Grunsky, has written to say that his work was holding him in San Francisco and preventing him from having a share in our discussions; he asks that you be so kind as to excuse his absence. Mr. de Thierry will please open the discussion by reading the conclusions of the General Reporter.

Mr. de Thierry read these conclusions as follows :

I. *It is desirable that a limit be set to the draught of sea-going vessels.*

II. *Government aid should not be extended to the building or operation of sea-going vessels whose draught exceeds 9.5 meters (32.2 feet).*

III. *There should be an international agreement fixing the maximum dimensions of sea-going vessels built or operated under Government subvention, and there are tentatively suggested the following :*

<i>Length over all :</i>	<i>900 feet (275 meters)</i>
<i>Breadth</i>	<i>105 feet (32 meters)</i>
<i>Draught</i>	<i>32.2 feet (9.5 meters)</i>

IV. *Any maritime canal which has locks with a usable length of 1,000 feet (305 meters), a width of 110 feet (33.6 meters) and a depth of water on the sill of 35 feet (10.7 meters) will fulfill every reasonable requirement of commerce.*

V. *In a maritime canal a wet section 5 times as large as the immersed portion of the largest ship which is to use the canal is desirable, as also a depth of one meter under the keel; but these values are functions of the speed at which the canal is to be navigated and therefore to some extent also of the volume of commerce, and are to be determined by local conditions.*

The Chairman. — In accordance with the generally adopted practice, I invite the Reporters in succession to state their opinions.

Mr. de Thierry has the floor.

M.R. de Thierry (in German).— First of all, I must offer all my thanks and gratitude to the General Reporter for the great trouble he has taken and the skill he has shown in summing up the long reports which relate to the second question, and which have been laid before the Congress.

There is an intimate relation between the dimensions of maritime canals and the size of sea-going vessels. It can be easily understood, therefore, why several reporters have taken up essentially this side of the problem.

So far as I am concerned, *I consider that the technical question may not be separated at all from the economic question.* I have given evidence of this personal opinion by dwelling, in my report, very nearly as much on the economic as on the technical side of the subject.

I hold that, *from the economic standpoint*, it would be a mistake to build a maritime canal, from the start, with a size in proportion to that which the sea-going vessels of the future may demand in the long run. The engineer who prepares the plans of a navigable highway should rather keep in view the thought of so building the canal that it may be adapted later on to the future demands of navigation. I believe that this side of the problem should be made especially important and I started from this principle in laying down the conclusions at the end of my report.

In his final conclusions, the General Reporter proposes to place a limit to the increase of the size of ships, by deciding that all Governmental assistance be refused for vessels of more than 275 metres in length, 32 metres in breadth and drawing more than 9.50 m.

I grant, with the General Reporter, that the increasing size of sea-going vessels places the engineer, who has to work out projects for ports, for maritime canals and other plants to be used for ocean navigation, in a very difficult position. The fear lest the constructions, which seem at the present moment to answer all needs, should become insufficient or out of date in the course of a few years, is surely thoroughly justified. But

it is very doubtful whether the measures proposed by the General Reporter will accomplish the desired end.

Attention will be invited, first of all, to this point that *the largest ships*, now in commission or still on the stocks, *were built without any assistance from the State*. Germany grants no subsidies, and the steamer "*Imperator*" of the Hamburg-America Line was built without any pecuniary intervention on the part of the Government. I believe that the English Government did grant a subvention for the construction of the "*Lusitania*" and "*Mauritania*"; but the "*Olympic*" and "*Titanic*" were built without any such aid.

If, then, the construction of the largest ships was possible without subsidies, it must certainly be admitted that other causes than the subventions granted to the builders led to their being laid down.

In my opinion, the increase in the size of steamers must be attributed, up to a certain point, to economic reasons. The fact observed during the last economic depression, that it was not the advance of large ships, but of small ones which remained stationary, seems to me to be the best proof of the economic justification of large ships. If the hypothesis, that it is economic reasons which lead to the construction of these giants of the seas, be exact, I think that it should be admitted that it is economic reasons again which must put a stop to the increase of size. It would be hard to say whether this limit be already reached or whether it be near at hand.

A certain competition between nations which desire to own the largest vessels seems also to help in bringing about the advance in the size of sea-going ships, and I consider that a stop would be put to this competition at once, if the United States of America were to fix the maximum size of the steamers which should be allowed to enter its ports. But it seems to me doubtful whether we may vote a conclusion here, which would have the capacity for preparing an obstacle to the natural course of things.

If the necessity, under economic reasons, exist for building ships of constantly increasing size, any resolution which might be voted during a session to set a limit to the future size of vessels would remain void and of none effect.

View should not be lost of the fact, furthermore, that England only joined the Association of Congresses of Navigation in so far as inland navigation is concerned. Still, the hope continues to exist that England will join our Association in the end for questions relating to ocean navigation also. But a resolution which, without the concurrence of England, should lay down for the peoples of the world what the maximum dimensions are for the largest vessels, would fail in its object and would surely not have, as its effect, to bring new members to our Association.

I think, therefore, that we would do well to omit from our conclusions the question of the size of sea-going ships in the future and to devote our attention solely to what touches the construction of maritime canals.

The Chairman. — Mr. King has the floor.

Mr. King (in English). — Thought that possibly the members and reporters being, as he understood, chiefly interested as civil engineers, allowed the existence of a few large vessels on one route to bulk too largely in their estimate of the general future development of waterways. The enormous mass of data in his paper shews that all the dimensions of all classes of ships on all routes, have developed in regular progression during 60 years and as it is very un-likely that the rate will *diminish* during the next 60 years, he desired to emphasize the view that all ports and all waterways which do not provide for a rate of expansion in dimensions from those of the ships which frequent them to-day, of at least 50 % in length, 60 % in breadth and 33 % in draught in 60 years, must fall back in position. The diagrams shew the present very large Atlantic liners to be abnormal to the mass of development and it is a matter for serious consideration, even if we accept their technical and commercial success as established, whether we should go beyond accepting them as a proof of what the future holds, when the rate of world expansion demands so much, as the diagrams indicate, and represents such gigantic propositions for civil engineers.

Having regard to the fact that past expansion in the dimensions of ships has been the irresistible outcome of commercial develop-

ment, independent of either government support or the development of waterways ahead of demand, he considered that the Congress would be unwise to adopt the first four conclusions of the general reporter.

The Chairman. — Mr. Leemans is the reporter for the Netherlands on this subject, but, as he is absent, I shall ask Mr. Jollès to be so kind as to state the views of his colleague as well as his own.

Mr. Jolles (in English) means that by the remarkable increase of the dimensions of ocean ships this question is of the utmost importance. He is opposed principally to stating the question as the general reporter does, by making an effort to commit our Congress to the view that the increase in the size and draught of ocean ships should be limited by international agreements.

Nor does he see what good would result from limiting the size of ocean vessels, which point must be left to the interests of commerce and trade, which have to judge whether it will be more economical to move freight in great masses than it is to move it in smaller ones.

The object of the Congress is to promote navigation, not to restrain it. The waterway to Rotterdam has now a least depth of twenty-eight feet at low water; ships of a draught of thirty feet have passed in and out at average flood tide. The lock of the waterway to Amsterdam has a breadth of 82 feet, by a length of 740 feet and a depth of 30 feet at mean low water. And we do not intend to stop there, as it is very probable that in a few years the depth of the Rotterdam waterway will be increased by from 3 to 5 feet, which will require relatively little dredging, and that there will be under construction at Amsterdam a lock of 1,200 feet in length, by 130 feet in breadth and 43 feet in depth.

The Holland-America Line has now ships of one meter more draught than the proposed 9 1/2 meters, which are built at the cost of the Company alone without any aid from the Government.

Mr. Jollès is in accord with Mr. de Thierry to maintain only the fifth paragraph of the proposed conclusions.

Mr. Corthell (in English). — Gentlemen, I shall take the floor, not as Chairman but as one of the reporters.

This question is one in which, as you all know, I have taken a great deal of interest for the past fourteen years, having written four reports on this subject, three of them for Congresses of Navigation and one for another association. The only trouble with my work is that my predictions have fallen short of the actual facts. My view is this; we have nothing to do with this question of referring the matter to an International Conference. It is outside of the methods and principles of this Association and I can assure the Congress of one thing from my own experience with the British Government. I worked for two years in London in my attempts to obtain the adhesion of the British Government to this Congress, and my efforts were unavailing and I will tell you the simple reason. I stated it in a letter two years afterwards, when I again made the attempt January 30, 1911. This letter was written to a British gentleman who is a member of this Congress. The situation was not clearly understood by the shipping interests, they having the erroneous idea that the Congress is more in the nature of a conference like the Washington Conference of some years ago, which adopted International rules and regulations binding upon all Maritime nations. In the case of the Navigation Congress, there is absolutely no such obligation upon the Governments uniting with it and sending their representatives to the Permanent Commission at Brussels. The entire object of the Congress is to ascertain the consensus of opinion in reference to questions relating to Inland and Maritime navigation and having mostly to do with the plans, construction, maintenance and operation of works. The shipping interests of England have not yielded upon that point, and it is because those great shipping interests are rather afraid that, if they come into this Congress, they will be outvoted in the Congress and that some rules and regulations will be adopted and some restrictions be placed on their commerce which will be injurious to their interests. If we should adopt these conclusions as presented by the General Reporter, you will never see the British Government in this Congress. That I know positively, I have been there and I know all about it.

Mr. King has told you of the regular advance of the last sixty years. We are not going to stop that advance, it is going on; it may not go on with its present rapidity, but it will not have to go much further before ships cannot get through the Panama canal. The width of one of our battle ships is 98 feet, and another still wider is under construction. The Panama canal only leaves 5 feet on each side, in the locks, if the width of the battle ship is increased to 100 feet. In the face of the Titanic disaster, there was launched in Germany a vessel 10 feet longer than the Titanic, and there will be another launched at the same yard where the Titanic was built, a vessel 15 feet longer than she but of the same width.

I have had some correspondence with my associate reporters and I wrote to Mr. Leemans and I have his answer; that was before the General Reporter had made his report. It was when he had heard that a bill had been introduced into Congress to limit the size of ships. He says, "I wonder if the effort to be made to commit the Congress to the view that the increase in size and draught of ocean vessels should, by international agreement, be limited to certain given dimensions will have any success. I should think it is not the matter of a Congress at all, to vote such a question. Development of Navigation must have its free course and not be limited by international agreements or laws, the righteousness of which being disputable."

I will go a little further. I have a letter from Mr. Eich, chief engineer of the Kaiser Wilhelm Canal and he has given me the dimensions of the locks now building. "The new locks of the canal are to have a chamber length of 330 m (1,083 ft.) they are to be 45 m (148 ft) wide and 13.77 m (45 ft) deep below the mean level of the water. 12 m (39.4 ft) below mean low water of the Baltic and the Elbe respectively. These large dimensions are decided upon because the ships will without doubt increase in size, but it cannot be known as yet, in which direction and how much the enlargement will be. These dimensions were decided on with great care as it would be almost out of the question, because of the location, to build new locks in the future next to those then existing." Mr. Eich sent me in German a very interesting note on the subject of the new Kaiser Wilhelm locks published in the "Marine Rundschau", June 1907. The Canal has now almost

reached the limit of its capacity and power, which, in the first place, is due to the extraordinary and unforeseen development of shipbuilding technic in the last decade. From 1880 until 1886 the following measurements—145 long, 22 wide 8.5 deep were deemed sufficient for ships destined for the Baltic trade. It was thought at the time that these outside measurements would hold good for a long time and the locks were made accordingly 150 m long 25 m wide and 10 m deep below mean water level at Brunsbüttel and 9.6 m at Holtenau. But this theory was wrong. The keen competition of the various countries, ship owners and commercial companies and associations in connection with the progress of modern technic, have called forth ships of a size undreamed of in former years. Big liners have now a larger bottom than the locks of the canal, in their present shape, can accommodate. The dimensions of the men of war in active service of 13,200 tons are just within the limit allowing the passage of the canal.

The new ship being built for Brazil is 32,000 tons. The canal will lose half its value just to soon as the iron clads cannot enter it, thus affecting the striking power of the navy. Beside that, the Navy must see that the Canal is available and navigable for the large trading vessels which, in a casus belli, are to be used as auxiliaries. The possibility of a safe and fast passage for all ships of the navy must at any time in the future be assured.

That is the case with the great canals, the Suez, the Panama and Kaiser Wilhelm and others which may be built to carry the navies of the world. Their dimensions will be conclusive for the size of the vessels which in future may pass the canal. The locks are to have a length of 330 m between the gates, a width of 45 m and a depth of 13.77 m below mean canal water level. (the mean height of water in the Baltic).

There will be a question raised here, in view of the terrible disaster of the Titanic, as to the size of vessels.

Many people have the idea that, somehow or other, that disaster was due to the size of the vessel. I think every naval architect and navigator and engineer acquainted with the situation will say it had nothing to do with it. In fact the disaster would have been greater if the ship had been smaller and I have taken the

occasion to cut out some clippings and views of a naval architect, if you will allow me to refer to them. One of our own very prominent architects, Chief Constructor of the British Navy some years ago, M. Nixon says : "The bigger the ship, the greater the safety". He continued, "The big liners of today are so built that they can ride out the most terrific typhoon and come into port with every passenger safe on board. Even the report of the Senate Committee of the United States, which has very severely criticised even Captain Smith who went down with his ship, and others who survived have made this report, dated New York May 23, 1912. In that report, which is to be submitted to the Senate on Tuesday next, it says "The impact, although equal in momentum to the impact of the combined broad sides of twenty great battle ships, being scarcely felt on the vessel, such was her giant size and enormous stability".

Recently in London, April 16, 1912, in the report of the Shipping World, I find an article, the subject of which is, "Unsinkable Ships" by a member of the Naval Architects of Great Britain. "The fact is that no ship can be so built as to withstand such injury as the Titanic received, and it is not a matter of surprise that the ship went down, but it is that she remained afloat as long as she did. A smaller ship with relatively inferior watertight subdivision would likely have sunk like a stone in a very short time with no survivors to tell the tale."

For these reasons, first, because these conclusions of the General Reporter are not at all, in general features, the general consensus of the reports; second, they are opposed to the practice of this Association which has always opposed influencing legislation or interfering with international politics, I am in favor of the proposition made that we strike out all but the fifth paragraph of this report which I think we are perfectly safe in adopting.

I might say while on this subject of size, that on May 23d, 1912, at Hamburg, Emperor William launched the world's largest ship, the Hamburg-American Liner "Imperator" ten and one half feet longer than the ill fated "Titanic".

The Chairman. — Mr. de Joly has the floor.

Mr. de Joly (in French). — On account of the involuntary absence of my fellow countryman, Mr. Quellence, appointed as the French reporter for this question, and leaving to my friend Mr. Perrier, who is particularly qualified as Chief Engineer of the Suez Canal, the care of treating the subject of maritime canals, I ask permission of the section to explain why we cannot accept the first conclusions of the General Reporter.

However seductive the limitation of the size of ships by international agreement may appear to certain Governments, cities and companies interested in certain ports, we believe that this limitation has no more chance of success than has the limitation of armaments, sought after by noble minds but which, so far, has shown itself to be chimerical.

Furthermore, Mr. Grunsky took from his proposition the greater part of the attractiveness which it might have had for us Europeans, from the financial point of view, when he set apart in a special class the vessels which serve the lines connecting New York with the corresponding ports of our old continent. It is, above all, these ports which cost us very dear for their constant improvement and which find their dimensions regulated by those of the port of New York. Let the American authorities, which have made the Ambrose Channel 40 feet deep, refrain from exceeding this figure, they will have done more for the limitation of the size of ships than could accomplish the best prepared international agreement. The channels at New York, like the Suez and the Panama canal, will act as regulators.

The dimensions given as maxima by Mr. Grunsky are even now exceeded at certain French ports, such as Havre and Marseilles, where the new works under construction involve depths of 12 meters below low water. If New York set the example, this depth will be carried to 14 metres below low water at Havre where there is, besides, a tidal oscillation of 8 metres.

Should the size of ships, then, be considered as indefinite? This is not sure, if materials and mode of construction of vessels remain as they are, as Mr. Corthell's method of extrapolation supposes implicitly. Just as the increase of speed seems to have stopped

since the packets "Lusitania" and "Mauretania" came upon the scene, so a day will come when technical, financial or commercial difficulties will stop the increase of size, but this day is not yet here and the dimensions noted in Mr. Corthell's last report, and endorsed by the implicit acceptance of the principal port authorities, will certainly be reached.

Beyond begins the unknown. Mr. Bertin, the well known naval constructor, when opening the last meeting of the French Technical Maritime Association, pointed out that some day the limit imposed on the increase of size would be found in the growth of the fraction of the displacement of ships devoted to the weight of the hull. For equal weights of materials, this fraction should, "grosso modo" increase with the length. It was only a quarter when the use of iron began for construction. It is about a half for the Mauretania. Even now its tendency would be toward unity if the quality and distribution of the materials had not changed.

The use of stronger materials than our present steels, the employment of new modes of propulsion will delay the moment when the efficiency of the ship will become too small; but the necessities of safety, and especially the breaking up into cellular sections, to which the catastrophe of the Titanic has just cruelly called attention, will act perhaps in a reverse direction by leading to an increase of the fraction of the weight of the hull. Be this as it may, there will be a limit which the resources of our art and those also of our purse will show us some day.

Let this come of itself without our seeking to substitute for it an artificial day by means of an international agreement, and if the size and depth of ports must needs stop, before that time, the advance in the size and draught of ships, let our kind hosts of today, the Americans, begin. (*Applause.*)

The Chairman. — Mr. Perrier has the floor.

Mr. Perrier (in French) took sides with the preceding speakers in proposing to set aside the conclusions of the General Reporter in the matter of limiting the size of ships. Any rules which might be adopted would be ineffective. The increase of the tonnage of vessels is manifestly the result of an economic law, and ports and

maritime canals must be transformed so as to take in ships which are ever becoming larger and larger. Great works have had to be undertaken everywhere during the last few years. Even at New York, where conditions are so favorable, the *Ambrose Channel* has to be dredged, at great cost, in order to allow the great modern packets an easy access.

Past experience shows that the advance of the size of ships will continue in the future and that it must be expected at all ports.

But it is important to note that this size varies with the commercial necessities observed on the different lines of navigation. It is thus that the largest vessels in the world are found exclusively, as several of the reporters have pointed out, on the lines which connect New York with the great European ports. The enormous tonnage of these ships is justified by the traffic which they have to carry. Alongside of the great bulk of freight to be borne, there is between Europe and America a large movement of passengers of whom many make great demands in the matter of the speed and the comfort of the crossings. It must be granted that the great size reached by the ships devoted to this trade is the result of economic conditions and not of subsidies from Governments, as many of these enormous packets, the largest, if not the fastest, receive nothing in the way of a grant.

On the other great lines of navigation of the world, where the economic situation is different, the ships are smaller. This is especially the case with the ships which frequent the *Suez Canal* and which keep up the relations between Europe on the one side and the Indies, the Far East, Australia, the East Coast of Africa on the other. The maritime traffic between the ports on the East coast of North America and the same regions of the Far East also follows the *Suez Canal*, a traffic of which only a part will be turned aside after the opening of the *Panama Canal*.

The size of the vessels which frequent the *Suez Canal* has increased regularly so far, and there is no doubt about their still continuing to increase in the future. Contrary to what has been often said, it is by no means, nor will it be limited by the measurements of the cross-section of the canal.

Far from regarding the canal as a sort of regulator to limit the size of vessels and particularly their draught, the Universal Com-

pany of the Maritime Suez Canal has taken the resolution of constantly improving and transforming the canal so as to offer a sure, quick and easy passage for ships of the largest size which economic and commercial considerations may lead shipowners to run on the lines of navigation interested.

It is well to recall, in this connection, that, in spite of the financial difficulties of the beginning, the *Suez Canal* was so built as to be able to give passage to the largest ships afloat when it was opened to navigation. So soon as trade developed, the Company prepared itself to make every useful improvement in the Canal.

An international Committee, composed of eminent engineers and seamen from the various countries of Europe, was called upon to prepare a project for great works of improvement to be carried out on the Canal. After a thorough study, the Committee drew up a programme which, considering the time, was laid out with a very great breadth of views and included the widening and deepening of the canal. The work was put under way at once.

The Committee had thought that, after having finished the works which it had recommended and which involved increasing the depth to 9 metres, the Suez Canal Company could rightly refuse absolutely any subsequent demand which might be made for any further improvement of the canal.

The Committee was mistaken on this point which it is well to recall, at the moment when discussion is started on a proposition having in view the limitation of the size of ships or of the works for sea ports and maritime canals.

The deepening laid down by the Committee as having to be the very last done, was carried out very quickly. Other successive increases of depth were started so as to allow, as needed, an augmentation of the draught of water authorized for vessels passing through the canal, this draught being advanced successively to 7.80 m, then to 8.00 m in 1902, to 8.23 m in 1906 and to 8.53 m (28 feet) in 1908.

Since 1908, dredging to a depth of 11 meters has gone on steadily in the canal; the deepening is now well advanced and the draught authorized for vessels using the canal can be soon increased.

The main obstacle to increasing the depth of the *Suez Canal*

does not lie in the canal itself, which can be widened and deepened, no doubt, at the cost of important and expensive works which offer no difficulty of execution, but is found in the difficulty of maintaining a sufficient draught of water in the passes of the roadstead at Port Saïd. These passes are opened through a beach of fine and very muddy sand with an extremely gentle natural slope.

In spite of removing every year more than two million (2 000 000) cubic metres, which have to be dredged at sea with ladder dredges, it is only with great trouble that there can be maintained, in the channel, depths a little greater than the draught of water now allowed for steamers passing through the maritime canal.

In order to remedy this situation, the Suez Canal Company has just undertaken an extension seaward of 2,500 metres for the existing West jetty which already projects about 2,000 metres beyond the line of low tide.

The depth of dredging in the canal will not stop at 11 metres; it is to be carried to 12 metres, and nothing will be omitted to obtain this new depth in a very short time.

Other deepenings and new works of improvement will be carried on hereafter so as to keep the canal always up to the progress of shipbuilding.

The public declarations of Prince d'Arenberg, President of the Universal Suez Canal Company, at the recent stockholders' meetings, can leave no doubt as to the intentions of the Company.

The Company is guided, in the decisions which it must make in regard to the subject of works for the improvement of the canal, by the advice of an international consulting Committee which includes eminent engineers from the principal countries in Europe, many of whom are now taking part in the labors of this Congress.

Most of the great navigation companies, interested in trade by way of the Suez Canal are also represented in the Council of Administration of the Company which is thus admirably situated to appreciate exactly the needs of navigation.

These are the best possible guarantees that the Suez Canal will be kept up always to economic demands and that it will never be a hindrance or an obstacle to navigation. (*Applause*).

The Chairman. — Mr. Vandervin has the floor.

Mr. Vandervin (in French) pointed out a mistake which had slipped into the general report. Mr. Grunsky makes this statement on page 5:

"Mr. H. Vandervin, referring to the dimensions of larger vessels, believes that, especially draught and length considered from the point of view of stability, the maximum point on the curve of increase may have been reached."

Now, the report simply asks the question on page 2, and on page 6, it gives a reply quite contrary to that mentioned by Mr. Grunsky. It says, as a matter of fact :

"These considerations seem to show that the question can be neither stated nor solved in absolute and general terms.

"Wherever, at the two ends of great lines of navigation of the world, great depths of water exist or can be obtained, even at great cost, the draught of water of the ships of the regular lines serving these routes will still continue to increase, in all probability, as fast as builders shall judge strictly compatible with the structure of ships. The economic interest which holds to having vessels of very great tonnage will bring this about."

Mr. Jollès (in French) pointed out, by the way, another error which had slipped into the summary of Mr. Vandervin's report as it appears in the general report; it is stated there, in paragraph 1, page 9, that the per-centage of vessels drawing 7.50 m. entering the port of Antwerp was only 0.7 %, whereas this percentage refers to vessels having a draught of 8.00 m.

The Chairman. — Mr. Ducrocq has the floor.

Mr. Ducrocq (in French) agreed fully with Messrs. de Thierry, Corthell, de Joly, etc., in the matter of the conclusions to be adopted. If he spoke after them, it was only to point out a correction to be made in regard to the *port of Havre*, in the table on pp. 22 and 23 of the report of his friend Mr. Vandervin. This table is called: "The principal ports of the world classified by countries and in accordance with the depths of water at mean high tide now found in their approaches or which it is expected to obtain."

The *port of Havre* appears there with a depth of only 9.60 m. Now, its approaches show a depth of 12 metres at the present moment, not at mean high water but at the lowest of high tides. Dredging is at present going on to increase this depth very shortly to 13.50 m, to say nothing of the much more important works to which Mr. de Jolly alluded, valued at 85,000,000 francs, and laid out with a view to insure depths reaching 14 metres below the level of the lowest tides, or 20 metres below the level of the lowest high tides.

The Chairman. — Mr. Dondona has the floor.

Mr. Dondona (in English). — I agree perfectly with the gentlemen who spoke before me on the propriety of not voting the first four conclusions of the general reporter; but, frankly, I do not understand why we ought to vote on the fifth conclusion, which is made up of two parts, the second of which is practically opposed to the first stating that the figures there proposed are in every case to be determined by local conditions and so abolishing the value of the same figures.

I propose to vote only the first part of the conclusion fifth, suppressing the second part; and to vote also the first conclusion of the paper of Mr. de Thierry, according to which the dimensions to be given to maritime canals must be determined only by the sizes of the ships ruling at the time of construction of the canal and providing means for an easy enlargement.

The Chairman. — Mr. de Joly has the floor.

Mr. de Joly (in French). — It seems to me that the fifth conclusion of the General Reporter can raise no very lively objection. As a matter of fact, it offers as *desirable* the points which it states. Much as I am opposed to the first four conclusions which Mr. Grunsky, of whose work every speaker has expressed his appreciation, has unfortunately not been able to maintain, equally ready am I to vote the fifth conclusion as it stands.

The Chairman. — I think that we are all agreed to put to the vote the proposition to adopt Mr. Grunsky's fifth conclusion (*Assent.*)

The proposition was voted on and adopted by the Section.

So, the following conclusion is accepted :

In a maritime canal a wet section 5 times as large as the immersed portion of the largest ship which is to use the canal is desirable, as also a depth of one metre under the keel; but these values are functions of the speed at which the canal is to be navigated and therefore to some extent also of the volume of commerce, and are to be determined by local conditions.

The meeting adjourned at 4.30 p. m.

SECOND SECTION

(Ocean Navigation)

FOURTH SESSION.

Monday morning, May 27, 1912.

Mr. CORTHELL in the Chair.

The meeting was called to order at 9.30.

The Chairman (in English). — In conformity with the programme laid down, the examination of the communications placed before the Congress will be taken up to-day. The first and fourth communications will be considered this morning, the second and third being reserved for this afternoon's session.

I will mention that, in accordance with the rules of the Congress, *no vote is to be cast on communications*. Conclusions, printed in italics, have been drawn up by some of the general reporters, but no vote is to be put forth in regard to them.

The **first communication** on our order of business is :

High powered dredges and means for removing rock under water.

This question has been treated in several reports sent in by : Mr. Blumcke (Germany); Mr. Hernandez (Spain); Mr. Williamson (United States); Mr. Vidal (France); Mr. Koch (Hungary); Mr. Fossataro (Italy); Messrs. de Kanter and Wesseling (Netherlands), and Mr. Sundblad (Sweden).

The Chairman. — Mr. Saunders, the General Reporter on the communication, asks to be excused for his inability to be present

at the meeting, and I notice that the Reporters whose names I have just mentioned have also been prevented from coming.

Under these circumstances, I should like to have read to you a note sent in to the Chairman by Mr. A.-W. Robinson, of Montreal, one of our best Engineer-specialists in all matters pertaining to the construction of high powered dredges. Mr. Robinson's views are very highly appreciated in the United States, so I shall ask Mr. de Thierry to be so kind as to read his note and to summarize it in the other two languages of the Congress.

Mr. de Thierry reads, in English, Mr. Robinson's note as follows :

In reading the papers on this subject and the general conclusions of Mr. Saunders, the General Reporter, I would like to add a few notes based on my experience.

The general state of the art of Dredging and Dredging Machinery in America is backward, and our foreign friends will find but few examples of large, well designed and well equipped machines comparable with those used by the large works in Europe. Nevertheless, we have developed in America two special types, which have been brought to a high state of efficiency. I refer to the multiple sub-marine rock drill and to the dipper dredge. Mr. Saunders, as President of a large Company which makes rock drills, has well described them and you will see more samples on the various works you will visit.

Mr. Saunders compares the two great methods of working rock, namely the "Lobnitz" rock cutter and the drill. Undoubtedly, there are conditions under which the drill will do better than the Lobnitz machine, and vice-versa, but Mr. Saunders does not state the case sufficiently for the Lobnitz machine, when he says it is limited to thinly stratified rock and to less than two ft. in depth. The examples quoted are of the year 1907, or five years ago, and since that time, many rock cutters have been built that are giving better results than those stated in the paper, notably at Aberdeen, where solid Granite is being broken in layers of three ft. at the rate of 10 cu. yds. per hour.

Further considerations in favor of the Lobnitz machine are
First : Freedom from risk of explosions, and

Second : Freedom from loss of partly drilled holes when the drill must be removed for passing vessels.

It is now certain that rock of any hardness can be broken at a proportionate rate and any thickness can be taken off in layers of 3 ft.

With regard to the dipper dredge, I feel that its value is not fully appreciated in Europe as it deserves to be, and that, likewise, the ladder dredge is not properly appreciated in America. They have each been developed in their own field; and here I would warn against any attempt to construct either of these types out of its own country and environment, without the fullest knowledge and correct designs. You will see in the Cape Cod Canal, two large modern dipper dredges, nearing completion from the writer's designs, each having a dipper of 10 cu. yds. capacity, with a digging power of 100 tons.

With regard to the central control system for the ladder dredge, described by Mr. Blumke, I have long advocated this method and you will see in Boston Harbor, a large ladder dredge called the "Denver" in which all the movements of the main engine and moorings are controlled by one man in a Pilot house.

This dredge has buckets of 1 1/4 cu. yds. capacity, and can dredge a cut 600 ft. wide and 50 ft. deep at one time. It is fitted with the writer's improved durable pins and bushings—which have withstood three years' wear without renewal—and patent renewable face plates for tumblers, which can be removed without taking down the buckets.

CONCLUSIONS

The general state of the art of dredging and of dredging machinery in America is backward and our foreign friends will find but few examples of large, well designed and well equipped machines comparable with those used by the large works in Europe. Nevertheless we have developed in America, two special types which have been brought to a high state of efficiency. I refer to the remarkable sub-marine rock drill and the dipper dredge. Mr.

Saunders, as the President of a large Company which makes rock drills, has well described them, and you will see some examples on the various works you visit.

The Chairman. — Mr. Perrier has the floor.

Mr. Perrier (in French) gave some information about dredging in the **Suez Canal.**

The very variable characters of the soils to be dredged and the diversity of the conditions under which work has to be carried on have led to the adoption of very different machines in the various parts of the canal.

As the extremely fine soil of muddy sand, encountered in *the passes of the roadstead at Port Saïd*, is ill adapted to suction dredging on account of the difficulty of settlement for the material removed, the dredging is done with *large sea-going ladder dredges*. In order to make these machines as seaworthy as possible, there are used *self carrying dredges with bins* of 1200 cubic metres capacity, the hulls having a length of about 90 metres and drawing 5 metres. These dredges, of which the buckets hold 0.85 m³, are generally accompanied by dump-barges so as to obtain as great an output as possible. The volume of the excavated material on the Port Saïd roadstead during the past few years has exceeded an annual amount of 2,000,000 cubic metres.

In the maritime canal where the ground is of very varied consistency : more or less pure sand, soft or compact clay, marls, very hard clay and rocks, *ladder dredges* are generally employed. In the northern part of the canal, where the banks are low and when the conditions are suitable, *dredges with long discharge shoots* are used. They work very satisfactorily and the net cost of their digging compares favorably, in most cases, with that of the most modern appliances, ladder dredges or suction dredges with force pumps and with or without cutters for breaking up the soil.

Ladder dredges assisted by dump scows are the only ones used in very hard soils.

In order to remove the rocky ground, in the southern part of the canal, near Suez, as it is not suited to direct extraction by the

ladder dredges, it is first broken up by means of a *Lobnitz rock cutter*. The chisels of the machine in service weigh about 13 tons. Another machine under construction will be furnished with chisels weighing 20 tons and will be able to break up rock to a depth of 15 metres below the surface of the water.

The Lobnitz rock cutter is satisfactory in all the very variable soils met with in the Suez Canal : more or less hard and compact limestones, calcareous or silicious conglomerates, gypsum, alabaster. The rock is removed in layers which vary generally from 0.80 m. to 1.00 m. in thickness, the ram being so made as to leave a distance of 1.00 m. between the axes of two adjacent holes. The ground is well broken up in this way and the dredge works without difficulty, leaving the bottom smoothly levelled off. A few large blocks have to be moved aside, however, from time to time by means of divers and carried away individually by means of sheers or derricks.

No difficulty is found in removing rocky banks several metres thick by taking out the material in successive layers. The Lobnitz rock cutter is perfectly adapted to the removal of rock in a canal where navigation is going on, as the machine can be put out of the way easily when ships have to pass and as the work can go on without any danger in removing blocks of rock which might form dangerous projections above the bottom of the canal.

Under the conditions which exist on the Suez Canal, the removal of rock by means of chisel boats is manifestly to be preferred, from every point of view, to its removal by blasting.

The net cost of breaking up the rock varies greatly according to the nature of the ground. It may be said as a rule that it runs very close to fcs 2.50 per cubic metre for cost of working and repairs of the rock cutter, including all the interruptions involved in carrying on work in a canal where traffic is constant. This cost may be nearly doubled, and increased to 5 francs, in order to take in general expenses, heavy repairs and the amortization of the plant.

The net cost of dredging the broken-up rock amounts to about the same as that of breaking it.

The Chairman (in English). — Much of the information given by Mr. Perrier has been confirmed recently in a communication

which I have received from an Engineer connected with the works on the Danube. I have been led, during a study of this question, to examine closely a number of reports of the Chief of Engineers, U. S. Army, including that of 1911. These reports relate to 18 pieces of work situated at 7 different points in the country and show the cost of removing rock under water at Boston, New York, Jacksonville (Florida), Chattanooga on the Tennessee River, Cincinnati on the Ohio, Chicago and Buffalo on the Great Lakes. The mean net cost for 52 bids accepted was about 5 dollars per cubic yard (= 34 francs per cubic metre) under varying conditions of depth of water and kind of rock. This, then, is what the removal of rock under water costs in the United States to-day. It must be observed, however, that this price includes the profit of the contractors who have carried out these works, whereas this element does not appear in the figures given for the Suez Canal.

Mr. Martinowsky has the floor.

Mr. Martinowsky (in English). — I know some cases of very economical work having been done on the Black Sea, by a ladder dredge, in rock where the thickness of the stratum did not exceed 1 to 1.50 m, and the depth of the stratum below the surface of the water was quite within reach of the ladder. It was possible, therefore to mine and break up this rock, by means of buckets, from underneath and to take out individual pieces up to 2 cubic yards in volume. Although I have not at hand just now exact data as to the cost of such work, I am convinced that the use of drilling and blasting—of which the cost is given in the general report—would, under the conditions mentioned above, have increased greatly the expense of the work of excavation on the Black Sea, of which the actual cost did not exceed 40 cents per yard.

Under normal conditions, the actual working time of a ladder dredge and its accompanying floating stock is only about 40 to 50 per-cent of the whole time, consequently the engines of the dredge are uselessly under steam for about half the time.

Interior combustion engines which can start and stop very quickly, if used for the excavating machinery as well as for the floating stock, would reduce very sensibly the cost of excavating and carrying away both heavy and light materials.

I therefore propose to the Second Section of the Congress to adopt the following conclusion :

“ The Second Section expresses the desire to have *the comparative economic study of ladder dredges driven by internal combustion motors, and of ladder dredges driven by steam motors* ” appear on the programme of the next Congress. ”

The Chairman (in English). — We cannot possibly decide on this subject, so I shall advise Mr. Martinowsky to submit his proposition to the Executive Committee of the Permanent International Association, at Brussels.

Mr. de Thierry has the floor.

Mr. de Thierry (in German). — Mr. Robinson, in his communication to the Congress, calls attention to certain dredges of which the various pieces of mechanism are controlled wholly from a distance, by means of *apparatus concentrated in a pilot house*. I am rather sceptical as to whether such arrangements offer really any great advantages in proportion to the increased cost of construction of these dredges. They cannot bring about any sensible reduction of the force, because the make up of the crew depends upon the number of men required to transport and drop in the right place the anchors, by which the vessels' position is shifted, and to handle the scows. Under these conditions, the central command of dredges gives no advantages in proportion to the cost involved. It is not much liked either in Germany or in Holland.

The Chairman. — Mr. Kennedy, who is here, would surely give us all pleasure by letting us know the results of the experience which he has acquired during the dredging operations on the Saint-Lawrence. (*Assent.*)

Mr. John Kennedy (in English). — I think it can hardly be said that the ladder dredge has not been well developed and well appreciated on this continent, for it has been constantly used since 1844—and the whole ship channel between Montreal and the St. Lawrence ship channel and Quebec has been dredged with that type of dredge. The channel comprises an aggregate length

of dredging of over sixty miles; it is thirty feet in depth, and being deepened to thirty five feet, and four hundred and fifty feet in minimum width. The material to be dredged is of all sorts, including sand, soft clay and boulder clay and shale rock. The ladder dredges first used were of one type with buckets of about two cubic feet capacity, but in the course of the work we differentiated types, and greatly increased size and power. For the rock, buckets are made of a single steel casting, armed with four steel teeth and it has been so successful that it has been adopted in the United States, and to some extent in Europe, notably in the case of the Iron Gates of the Danube. Such buckets dredge rock of considerable hardness. They dredge quite easily the rock, which we know here as the Utica Shale, without blasting, at a cost of from 25 to 40 cents per cubic yard. For boulder clay, a larger bucket has been developed also with powerful teeth. For soft clay, a large bucket of 1 yard capacity without teeth has been developed, and this works exceedingly well.

In later years, hydraulic dredges have been used for the soft clay and for sand; an unusually large one with a discharge pipe of 3 feet in diameter, was designed by my friend Mr. Robinson, whose pupilage was served on the St. Lawrence. There are also on the St. Lawrence two other hydraulic dredges which are doing good work. For the harbor of Montreal we have developed another type of dredge, that is to say, the dipper dredge has been developed in a way of our own. We discarded the outside sheave blocks for multiplying power and substituted inside gearing with single steel rope leading to the bucket, giving direct pull and greater speed of movement. In the earlier dredges, up to 120,000 lbs. pull on the bucket, the rope is single, 2 1/4 to 3" diameter, but on the later dredges, which are of 200,000 lbs. pull, we have two 2 1/4" diameter ropes side by side acting as one. The earlier dredges had buckets of seven yards capacity armed with four powerful teeth, and Utica Shale rock is easily dredged with these. Buckets of five yards were first used but those of seven yards were found to work better even in rock. On the larger dredges of 200,000 lbs. pull, buckets of eight yards and twelve yards capacity are used. With these dredges shale rock can be dredged at from 30 to 40 cents per yard including all charges. Much attention has been given to the

form and disposition of the teeth, because, in the last analysis, the teeth of both ladder and dipper dredges are the cutting tools upon which the efficiency of the whole machine largely depends. In the ladder dredges solid teeth are used, each being made of a single forging or casting, but in the dipper dredges teeth with changeable points have been devised and are very successful. The size, shape and power of the teeth influence results more than the size of the buckets which are merely the receptacles for what has been cut by the teeth. In Montreal harbor considerable submarine rock blasting and dredging have also been done. The Utica Shale is in many places interspersed with dykes and beds of trap, and these we can take out with the dipper dredges easily if the beds are not over two feet in thickness, but beyond that blasting is necessary. The blasting costs about \$1.00 per yard and the dredging 25 cents per yard.

The bottom of the St. Lawrence is in many places strewn with glacial boulders up to sixty tons in weight and for the removal of these a type of machine, called stone lifters has been devised. They mainly consist of barges with a large central well, through which grips or grapples are lowered, and the stones lifted to the vessels deck. The grips are shaped and operated much in the same way as ordinary clam shells and have a spread, when open, to 14 feet and a breadth of 6 feet. They have interlocking teeth so arranged that they will grip stones of any size, say 6" diameter, up to the full spread of their opening.

The Chairman (in English). — Has any one further remarks to make? As no one wishes to speak, the **fourth communication** on our order of business can be taken up. Its title is :

Safety of Navigation. Lighted Buoys.

This subject has been treated in reports laid before the Congress by Messrs. Braun (Germany), Colonel Millis (United-States), de Joly (France), Stevenson (Great Britain), Van Braam van Vloten (Netherlands), General de Schokalsky (Russia), and Grönwall (Sweden).

In the absence of Mr. Putnam, the General Reporter on the communication, I shall give the floor to Colonel Millis.

Colonel John Millis (in English). — Mr. President and Gentlemen of the 2nd Section :

The intended scope of the reports to be submitted under the fourth communication, second section, may not have been understood uniformly by the authors of the several papers contributed. It is noted that most of the contributors confine their reports more or less rigidly to the sub-title "Lighted Buoys", but the report for the United States considers somewhat more broadly "safety of navigation" in general on the great American Lakes. Having been accepted for representation before the present Congress, the paper in question is presumably within the intent of the International Association in inviting contributions under this title. It is a matter of some regret, however, to the author of the paper from the United States, that a somewhat broader treatment was not considered appropriate by other writers, so that a comparison of views and a discussion of the suggestions presented might have been gone into by the General Reporter. Having only one paper that was written under a general interpretation of the title, he has necessarily been restricted in presenting an analysis of the papers or a discussion and summary of the suggestions. At the time the papers were prepared, the matter of safety of navigation in general had not the wide spread and I may say the painful interest for the general public that it has since unfortunately acquired through the Titanic disaster. On the great Lakes there have been disasters involving serious loss of life, but these have been of comparatively rare occurrence. Although any loss of life calls for serious consideration of means to prevent such loss, the paper now referred to considers mainly the property losses and the financial risks involved. The importance of the question is at once evident from the annual insurance premium of nearly \$20,000 that has now to be paid on a ten-thousand-ton ore carrying vessel that costs about \$300,000 to build. Such a vessel, under favourable conditions, transports about 250,000 to 300,000 tons of iron ore from the head of Lake Superior to Lake Erie ports as her season's work. The extraordinary economy that has been attained in transporting ore, coal and grain on the great lakes, in spite of this handicap in insurance cost, is well known and this economy, on a similar scale, has not been equalled anywhere else in the world, but when it is

recalled that the total losses directly connected with water transportation on the lakes has amounted to over \$15,000,000 in ten years, principally from collisions and strandings, it is apparent that further economies are possible, and that the demands are urgent for practicable measures to promote safety of navigation on the great lakes and to diminish the risks and losses. It is not necessary nor would it be appropriate to refer in detail to the suggestions summarised at the close of the paper under consideration, as they refer largely to practical details that are to be worked out under local conditions, and with some of which much progress has already been made. I would, however, refer to the fact that each of the larger questions, relative to the great lake's navigation and other uses of the waters, constitutes one physical and engineering problem. We are coming to realize more and more forcibly that none of these problems can be divided by an international boundary line, and I therefore think it appropriate before a Congress like this to call especial attention to suggestion n° 4 and to suggestion n° 1, which are among those submitted at the close of the paper from the United States. They are as follows :

N° 4. Further study of the problem of maintaining the levels of the lakes and regulating the variations of levels to meet the requirements of navigation, in connection with questions of utilizing all sites practically available for water power development ;

N° 1. A closer and more systematic co-operation and understanding between the officials of the Canadian Government and those of the United States Government in all matters concerned with the navigation on the lakes.

The Chairman. — Mr. de Joly has the floor.

Mr. de Joly (in French). — Colonel Millis regrets that the foreign reporters of the fourth communication have, as a rule, given the greater part of their attention to the second part of this subject, "*lighted buoys*", and not to the first, "*safety of navigation*". I, for my part, regret that the question of lighted buoys, the main one in our eyes, because more precise, should have been set aside by the American reporters; we should have liked on this point a clear statement of their views.

I do not think, furthermore, that the section may vote the con-

clusions brought to its attention by Colonel Millis. Indeed, the by-laws of our Association do not provide for conclusions, properly so called, on communications; secondly, Colonel Millis's propositions are matters of moment to the United States and to Canada and possess no real international character; finally, the questions of collisions and shipwrecks were expressly set aside from our order of business at the meeting of the Permanent Board which preceded the opening of our Congress.

I shall add but a few words to my report, *which treats especially of lighted buoys* and, *incidentally, of light ships* which are their extension, so to speak. The object of what I am about to say is to call the attention of the Congress to the importance of *incandescent lighting* for all lights used for lighting the shores of the ocean and other open seas. Petroleum vapor has been used, during the last fifteen years, for incandescent lighting in the lighthouses of France, and now it has spread to the entire world. We have also been, I believe, the first to generalize incandescence by gas for the use of lighted buoys. I have heard or read at times that the use of incandescent sleeves could not give good results with buoys exposed to being tumbled about by the sea. The figures in my report show that, with oil gas, sleeves last currently for several hundred days, that is to say their life is longer than we need, and that too, not only in our rivers and estuaries, but out in the open sea, 50 miles from shore and in the most exposed spots. Incandescence with acetylene is not quite so reliable but we have every reason to hope for more successful results.

The advantage obtained from incandescence is very marked from the point of view of luminous power, and we are led, at least in our country, to increase this mode of lighting. Did we not do this, seamen would not fail to call it to our minds. *Always more light* is the law for illumination *along the shore*, as it is for lighting the city and the home.

We are constantly at work for this result and incandescent lighting by petroleum or by gas has been a powerful means to this end.

The Chairman. — Mr. Apelt has the floor.

Mr. Apelt (in German) invited the attention of the Congress to the importance of *sub-marine bells* and to the satisfactory results

obtained with these signals on the German shores of the North Sea; he also made mention of the fact that all the large ships of the North German Lloyd are provided with a receiving apparatus for sub-marine signals.

The Chairman,— General de Schokalsky, who has an interesting communication to make us in regard to the conference for the safety of navigation recently held at St. Petersburg, has the floor.

General de Schokalsky (in English).

Gentlemen,

The previous Congress held at St. Petersburg expressed the wish that a special Maritime Conference should be convoked by the Imperial Russian Government in order to discuss matters concerning the safety of navigation. This subject was first brought to the notice of the Congress of Navigation by the communications addressed to it by Colonel Mordovin and myself at the St. Petersburg meeting.

This desire of the Congress held in St. Petersburg was fulfilled by the Russian Government, which invited all other Nations to take part in the discussion of navigation all over the world.

The International Maritime Conference of St. Petersburg took place at the Naval Ministry, Hydrographic Administration, about two months ago and was composed of the official delegates of the following Nations : Belgium, Germany, Greece, Denmark, France, Japan, Italy, Holland, Monaco, Norway, United States, Portugal, Sweden, Turkey, Spain, and Russia. The Conference, opened by the Minister of the Imperial Russian Navy, Admiral Grigorovitch, worked under my presidency seven days, twice every day.

In order to give you a clear idea about the matters discussed during the meetings, I shall read you the questions laid before the Conference by the Hydrographic Administration of the Imperial Russian Navy.

Programme of subjects to be considered by the International Maritime Conference held at St. Petersburg, in March 1912.

I. "Sailing directions» and "Notices to mariners".

a) Uniform method of publishing "Notices to mariners".

b) Uniform method of writing "Sailing directions".

c) International editions to be adopted.

1. A comparative and parallel dictionary of technical expressions in use on charts and in sailing directions and notices to mariners.

2. Parallel and comparative tables of conventional signs and systems of designation, which are given on marine nautical charts, including the explanatory text.

II. Charts.

1. Inscriptions on charts;

2. Scales, fractional and graphical;

3. Designation of meridians and parallels;

4. Measures of length on charts;

5. The level to which soundings and heights are reduced;

6. Methods of indicating the range, colour and characteristics of lights;

7. Designation of bearings;

8. The magnetic variation and the cards;

9. Streams, floods and ebbs;

10. Designation of inequalities of the bottom of the sea;

11. Designation of the channels and recommended courses;

12. Topography on marine charts;

13. Conventional symbols and lettering;

14. Methods of printing charts.

III. Marking dangers to Navigation.

Uniform system of buoys, beacons, poles, other marks and lightbuoys.

1. Uniformity in colour of the marks;

2. Uniformity in numbering the marks;

3. Uniformity in shape of the marks;

4. A uniform system of marking the dangers (the compass or other systems of marking);

5. A uniform system of marking fair-ways, channels and entrances of harbours;

6. A uniform system of marking dangerous wrecks;

7. A uniform system of marking telegraph and telephone cables;

8. Uniformity in character of lights defining the fairway (navigable) cuts of the whole light-sectors;

9. Uniformity in colour and character of lights defining the dangerous cuts of the light-sectors by which the fair way is limited.

As you can see the subject was divided into three parts, for the discussion of which three different Committees were elected. The conclusions adopted by the Conference as well as the discussions were to be published in full by the Naval Ministry of the Imperial Russian Navy. It is impossible to read you now all the conclusions in detail and I am able to communicate to you only the following general conclusions of the Conference.

I. — Questions concerning the safety of navigation regarding the ship herself, the manning, hydrography, lighting, lights, pilotage, salvage, rules of navigation, ship's instruments, international code, etc., etc., must figure in the programme at the International Congress of Navigation. These questions might be treated practically in a separate section at one of these congresses. The official representatives of the Governments at these Congresses should be able to understand the delegates attached to this special service.

II. — It is desirable that the Conference of the Safety of Navigation should become a permanent International Institution and that the intervals between its meetings should not be longer than three years. Russia might take the initiative in an international "entente" having this object in view.

III. — It is desirable that a local conference for the Baltic Sea, composed of delegates of Germany, Denmark, Norway, Russia and Sweden, should be convoked in order to propose a uniform system of buoys and marks for this sea. Russia might take the initiative in this matter.

I am very glad to report to you that the desire of the previous session of the Congress has been accomplished with great success and that it is possible to hope that this beginning will be the happy commencement of other valuable results in the general work of the Congress.

The Chairman. — Mr. Tincauzer has the floor.

Mr. Tincauzer (in German) stated that the Prussian government had tried *fog signals by the use of wireless telegraphy* on the course from Sassnitz to Trelleborg. The boats are provided with receivers and the shore stations with transmitters which work in foggy weather, so that the navigator may know, by means of the signals which he receives, what his position is with regard to the shore.

The Chairman. — Mr. de Joly has the floor.

Mr. de Joly (in French). — I have heard with great interest what M. Tincauzer has said about the views of the Prussian government concerning *the application of wireless telegraphy to navigation in foggy weather*. I wish to recall, in this connection, that my report to the Congress states that the lightship under construction to facilitate the landfall in coming toward the port of Havre, will be supplied not only with a siren and a sub-marine bell but also with a hertzian fog signal. A signal of this kind has been placed, and is even now on trial at the entrance to the British Channel, on Ouessant Island which occupies with regard to the French coast the position held by the Scilly Islands toward the coast of England, and another is soon to be set up on Sein Island, at the *desire of the French Navy*, to facilitate the landfall for Brest.

Hence the French government took up, so soon as it was possible, the application of wireless telegraphy to the safety of navigation. The methods of determining positions by means of hertzian fog signals are still in their infancy, but we are sure that they will be perfected and that they will be of valuable assistance to the safety of navigation, which is a legitimate object of study by all the nations of the world and especially of the people of the United States of America.

The Chairman. — Colonel Anderson has the floor.

Colonel Anderson (in English). — I should like, Mr. Chairman, to say a word in reply to Colonel Milliss' remarks about the increase of the safety of navigation on the Great Lakes.

Canada and the United States have already come to an agreement in regard to the rules of the road and have adopted a common regulation for pilotage, applicable at certain parts of narrow passages. I think that I can, unhesitatingly, assure the Government of the United States that the Canadian Government would be glad to lend its assistance to every measure suited to increase the safety of navigation on the Great Lakes.

I will add, in regard to what Mr. Joly has said about *incandescent sleeves* for buoys, that it has been observed in Canada that, when buoys lighted by gas are exposed to heavy seas, it is difficult to prevent the breakage of the sleeves. So, we are now using for our lights acetylene without sleeves. The sleeves work well in sheltered water where the shocks are less violent. I am surprised at the results obtained in France for the life of the sleeves and I shall avail myself of the opportunity offered to consult Mr. de Joly as to the possibility of improving ours.

In the matter of *sub-marine signals*, experience has shown us that they work well at places where they can be brought to the surface easily and without interrupting their service. It is not easy, as a general rule, to locate them on the bottom and to connect them electrically with the ship and not have more or less interruption of the service. Improvements should be sought to do away with the present difficulties in making repairs and of putting the signals in place.

Another point to which I desire very much to call attention, and which has been mentioned already by General Schokalsky, is uniformity in the rules adopted by the different countries for all signals which apply to ships. An international rule has been adopted for beacons and buoys, but the questions of lighted buoys and of range lights for narrow channels are not included in these rules. Captains ought to know, when they approach the shores of any country, that customs are the same there as everywhere else. Flashing lights on one side, fixed lights on the other; red lights on one shore, white lights on the other, or any other uniform arrangement. The recommendations of the Russian Maritime Conference are extremely interesting and useful. The rules of the road laid down by the former Universal Conference, held at Washington, have never been adopted by the United States for inland

waters. It has been changed so as to be adapted to the conditions of pilotage considered necessary in navigable highways of small width.

The Chairman. — If there be no further remarks to make the meeting will be adjourned until 2 o'clock P. M.

The meeting adjourned at noon.

SECOND SECTION

(Ocean Navigation)

FIFTH SESSION

Monday afternoon, May 27, 1912.

Mr. CORTHELL in the Chair.

The meeting was called to order at 2 o'clock.

The Chairman (in English). — Two subjects, the objects of the *second* and *third communications* in our order of business, still remain to be discussed. We will begin with the *second* which is entitled :

Report on the most recent works constructed at the more important sea ports, especially those relating to breakwaters. Applications of reinforced concrete. Means for insuring its preservation.

This subject is treated in the reports laid before the Congress by Mr. Mönch (Germany); Messrs. Bech, Monberg and Möller (Denmark); Mr. Hasskarl (United States); Mr. Voisin (France); Mr. Carey (Great Britain); Mr. Inglese (Italy); Mr. de Blocq van Kuffeler (Netherlands); Messrs. Lundberg and Fellenius (Sweden); Mr. Herrmann (Tunisia) and by the General Government of Algeria.

The Chairman (in English).— Lieut. Col. Edward Burr, General Reporter, has just arrived from Washington to be present at our meeting. I shall ask him to supplement the ideas developed in his report and to open the discussion of the subjects of the second communication.

Lieut. Col. Burr. — Having written the general report upon this communication and having therefore reviewed the reports which, with the general report, are now to be discussed, there is little for me to say in advance of that discussion. Should it however take such a form as to warrant further remark or explanation later at this meeting, I shall be very glad to take advantage of the opportunity to comment thereon.

The Chairman. — Following the order which has been observed so far in our discussions, I shall call upon the reporters here present from the various countries, to make any statement or supplementary remarks which they may consider necessary or useful for the discussion.

It may be interesting, however, to recall first the conclusions reached by Colonel Burr, so I shall ask Mr. de Thierry to be so kind as to read them.

Mr. de Thierry read Colonel Burr's conclusions which are as follows:

1. *Further experience tends to confirm the conclusion of the Congress of 1908 that the earlier results of the application of reinforced concrete to hydraulic and maritime works are encouraging and to indicate that reinforced concrete may be expected to be reasonably permanent in sea water if the precautions necessary to secure that end are intelligently and unremittingly exercised in accordance with the best experience in such works.*

2. *In view of the comparative novelty of this type of construction, its increasingly wide application, and the rapidly growing experience in its use, this subject should again be made a question for consideration at the next Congress.*

The Chairman. — The discussion will now begin. Mr. Voisin has the floor.

Mr. Voisin (in French) stated that the information contained in the reports from Algeria and Tunisia and in his own, on the construction of breakwaters in the sea, leads to this observation that the conclusions of Mr. de Joly's report, at the Congress of Milan, are still exact and can only be confirmed.

In so far as "reinforced concrete" is concerned, two points must be considered : the suitability of its use and the precautions to be taken to insure its preservation in sea water.

As to the first point, the question appears under the same aspect as in the first communication of the first Section and it seems to take into consideration the resolution adopted for this communication, after a long discussion based both on a question of rules and a technical question, that is to say : to place the use of reinforced concrete in the order of business of the next Congress, but as a " *question* " and not as a " *communication* ", so as to be able to reach more or less exact conclusions which the experience had so far seems, even now, to allow to be regarded as possible.

Mr. Voisin observed, furthermore, that this was exactly the meaning of the conclusions of the General Reporter, Colonel Burr, with whom he agreed, and he proposed that the conclusion of the first Section be adopted after having made therein the few slight changes which are the object of the following proposed wording :

" The second Section, after having heard the interesting reports
" which have been offered on breakwaters and on reinforced
" concrete in salt water,

" Whereas the experience with breakwaters acquired since the
" Congress of Milan and that with reinforced concrete since the
" Congress of St-Petersburg has only confirmed the conclusions
" adopted at those two Congresses, and

" Whereas the question of reinforced concrete in particular is
" one of exceptional importance,

" *Resolves, in accord with the 1st Section, that the use of rein-*
" *forced concrete in maritime works be placed on the order of*
" *business of the next Congress and be the objet of a "question"*
" *and not of a "communication".*

On the second point, Mr. Voisin believes that he can also stand by his conclusions.

The Chairman. — Mr. Inglese has the floor.

Mr. Inglese (in English). — The 2d question was divided into two parts. I treated the construction of breakwaters, Mr. Luiggi

treated the application of reinforced concrete in sea water. The breakwater at Naples which, at the time the report was written, was only 20 metres long, has now reached the length of 170 m. We, in Italy, are in the habit of adding *pozzuolana* to the concrete in order to neutralize the effects of the free lime which may swell while the concrete is setting. We have used at Ravenna, on the Adriatic sea, reinforced concrete piles for nearly 20 years and they have given excellent results.

I agree with Mr. Voisin in making the use of reinforced concrete a question to be taken up at the next Congress.

The Chairman (in English). — Thanks to Mr. Inglese's courtesy I was able, two years ago, to visit the works of the Granili breakwater, to which he has just alluded, and I saw that the concrete there is in the good condition which he mentions.

Gentlemen, I see that my colleague, Colonel Bogart, President of the First Section, is here; perhaps he will be so kind as to let us know what was, in his Section, the result of the discussion of a question very similar to the one which has our attention just now.

Colonel Bogart (in English). — The first communication brought up for examination in the first Section related to the applications of reinforced concrete in hydraulic works, hence the result of the discussion of this subject during the morning has an interest for the second Section.

I mentioned to the first Section, during our session, the conclusions reached by Colonel Burr, and I read also the opinion which he puts forth in the body of his report and which is worded as follows :

" Experience to the present time demonstrates that the engineer has in reinforced concrete a valuable device suitable for application to a wide and increasing variety of structures and it merely rests with him to develop it further and to apply it properly. Many heretofore undeveloped or obscure points in theory and in practice have been cleared up, but others remain for further study and in this direction, as well as in the improvement of the details of design, lie the most important fields for future investigation. "

We saw that Mr. Sewell had reached similar conclusions in the general report laid before the first Section. This being so, the question was examined whether it would not be well to appoint a sub-committee and to invite the second Section to adopt the same course, so as to leave to the two sub-committees the care of drawing up conclusions to be laid before the Congress. But, as the by-laws of the Association do not admit conclusions on communications, the matter was dropped and the *Section voted unanimously in favor of a motion to place the same subject, as a "question", on the order of business of the next Congress.*

The Chairman. — Mr. de Thierry has the floor.

Mr. de Thierry (in German). — I have been one of those who used to consider that the greatest caution should be used in the employment of reinforced concrete when exposed to the action of sea water. The experience of late years allows, however, the early fears to be somewhat reduced. I had the opportunity of seeing, in Holland, shore protections of reinforced concrete, of the Muralt system, at points where these structures were exposed to the action of waves and frost. The concrete used contained a *certain amount of trass* to neutralize the free lime. A spur 600 metres long, built seven years ago, did not show the slightest deterioration. This experience seems to me very reassuring. The experience obtained in Holland also shows that the system of construction there used is economical.

Having been called to Western Africa in 1911, as Consulting Engineer, to give my opinion on the construction of a port, I had no hesitation in recommending the use of reinforced concrete. Blocks of this material 7 metres wide and 2 metres long, resting on a stone embankment, were adopted for this African port. Each of these blocks weighs 100 metric tons, and there are made in each one three compartments, separated by walls of reinforced concrete and open at top and bottom, which are filled with riprap, so that if, by the action of the sea, any scour is produced, to cause a settlement at any point of the stone embankment, the rip-rap in the compartments can drop and fill up the hole, thus warding off the greatest of the dangers to which the jetties are exposed.

The Chairman. — Mr. Jollès has the floor.

Mr. Jollès (in French) stated that good results have been obtained in Holland with reinforced concrete, as mentioned by Mr. de Thierry and as is shown in detail by the report of Mr. de Blocq van Kuffelen and that Mr. de Muralt's system of construction, in particular, showed excellent qualities.

Mr. Jollès proposed that the subject of reinforced concrete be placed as a "question" in the order of business of the second Section of the next Congress, so that the use of reinforced concrete in sea water can also be taken into consideration.

The Chairman. — Mr. Cox has the floor.

Mr. Leonard M. Cox. — Referring to that part of the general report comprised under head of "Application of reinforced concrete to harbor works", it is noticed that among the various devices for effecting the placement of air-cured reinforced concrete under water—such as box caissons of timber, steel or concrete construction—no mention is made of the crib system. It seems to the speaker that the ancient timber crib method could be applied to work of this character with economy and satisfaction.

In this country the majority of our protected harbors are in locations where rock or hard bottom does not exist within practical depths. Most of our quay walls are therefore founded on piles. For economical reasons, the so-called platform wall has found favor on the Atlantic coast. Since our waters are infested with the teredo, all timber must be protected either by one of the many methods of timber treatment or by preventing the access of marine worms. The type therefore consists in a pile-borne platform at or about low water, protected in front by a timber, concrete or sheet-pile bulkhead. This platform is decked over and topped by a stone or concrete face wall. The stability of this type of wall is secured by running the timber sub-structure to landward and reinforcing by one, two or three tiers of spur piles.

In localities where the soil is so soft as to have a tendency to slide outward with the dredging necessary to obtain depths outside the wall, the question of proper anchorage becomes an important

one,—and presents a problem peculiar to each location. In my personal experience, various sections of the same work have required entirely different anchorage treatment.

Reinforced concrete would appear to offer a means of securing a gravity, or, so to speak, a monolith wall, doing away with all questions as to anchorage and all sub-soil obstruction to foundations for ancillary structures back of the wall. Such a gravity wall has heretofore been prohibited, except in certain sections of the port of New York and a few other localities, because of the excessive first cost.

It is generally admitted that concrete for sub-aqueous work should, where possible, be air-cured. Reinforced concrete should necessarily be fabricated above water. The caisson method enables this to be done, but has the objection of high cost, besides involving many inconveniences in the way of handling and placing.

If reinforced concrete crib logs were constructed on shore and lowered to a prepared sub-aqueous foundation by rod templates held in place by temporary wooden piles; and if these logs were then built up to low water in the form of a crib of such width as to secure stability, the cribs could then be filled with riprap or bagged concrete, the intermediate spaces keyed by bagged concrete, and the whole surmounted by a skeleton reinforced concrete face wall. The resulting construction would be wholly without timber and would offer a permanent, safe and satisfactory wall. It is not believed that the cost of this wall would compare unfavorably with the cost of many types now in use.

The concrete log crib is not suggested as a new or original type of wall. The idea has been used with several variations in certain existing works. The only idea in presenting it to the Congress is due to the belief that it merits consideration, and for the further reason that it can be adapted for us in the construction of dry docks. A skeleton reinforced concrete dry dock can be constructed on the theory of the timber docks so popular in this country 25 years ago. By cutting off the floor plan of the proposed dock by a thin and comparatively shallow concrete pile cut-off; enclosing the whole site back of the coping line with heavy concrete sheet-piling; placing inclined reinforced concrete stringers (at about an inclination of 45 degrees) and, finally, placing upon these

stringers reinforced concrete altar logs, air-cured and designed like the altar logs of timber docks, a practical and permanent commercial dock could be secured at a reasonable outlay. With such a dock the water would be cut off completely from the under side of the floor and it would no longer be necessary to provide the thick floor arches which sometimes run to a depth of 20 feet. As a matter of fact, such a dock would be perfectly safe with a four-foot floor.

Referring to the part of the general report entitled " Preservation of Reinforced Concrete in Harbor Works " : I would like to say just a word in regard to the much mooted question as to the proper manner in which to attain a water proof concrete. All agree that this can be done by making an impervious concrete and that an impervious concrete can be made by properly proportioning the ingredients and by proper methods of mixing. I am convinced of the truth of this conclusion, but submit that such ideal methods of construction can only be obtained in the laboratory or in small works, supervised by highly skilled men. Laboratory methods are impossible of attainment in practical works of magnitude. In contract work involving thousands of cubic yards of concrete, continually varying materials and daily varying personnel, it would seem that perfect work may not be anticipated and that the concrete product should not be expected to be absolutely impervious. It is, therefore, my opinion that waterproofing mixtures are worthy of serious consideration by practical engineers, although each of the mixtures known to the speaker must now be considered as being in the experimental stage.

Perhaps I should have used the term " density " instead of " waterproofing " in this connection since it is impermeable rather than waterproofing qualities which are desired. I should also except from the " experimental " category the trass mixture used by Professor Luiggi with which the writer has had some little experience.

Certainly, perfect methods of mixing concrete can never be attained with the present popular fashion of writing specifications in which one specific mix, regardless of changing material and workmen, is laid down for the whole work.

The Chairman. — Mr. Hedde has the floor.

Mr. Hedde (in German). — In spite of the great value of laboratory tests, the results of experience given by practice are far more important. It would be of the greatest utility, in my opinion to collect in all countries the data of experience gathered in connection with works of a certain age carried out in concrete and in reinforced concrete. The International Congresses of Navigation are reunions of engineers from all parts of the world who are best fitted to bring together the information which has a bearing both on the mode of constructing old works of this sort and on their subsequent action.

The Chairman (in English). — May I give here a bit of my experience in South America.

I have just finished an important work at Para near the mouth of the Amazon River. I built there a wall, more than a mile long, out of concrete blocks weighing 25 to 30 tons each. Finished two on three years ago, it offers some rather interesting peculiarities. I do not know of any case in which, for lack of stone, the engineer undertook to build a concrete wall of sand and cement. We did that of necessity as there is on the Amazon no stone within 500 miles. The blocks were made of one part of cement with three parts of sand. After having been exposed to the air for a space of six weeks the blocks were laid in a very variable water, sometimes brackish, sometimes fresh, sometimes salt. The current, too, is violent. I am not aware of any deterioration of any kind having occurred. The question of using cement at this place was studied carefully by all those of us who were connected with this work.

Another work, for which interesting plans have been prepared but which has not yet been built, is a pier, having a total height of 80 feet, for the port of San Francisco in the State of Santa Catharina, Brazil. The supporting piles to be used are 40 inches in diameter and 80 feet long. The structure will be quite similar to one built of timber.

In March of this year, I discovered accidentally a work of the same sort under construction. There was a great deal of doubt as

to the suitability of the pier which we proposed, although it would cost only four millions of dollars as against a solid stone wall which would cost eight millions. There has been under construction, for the past year-and-a-half, at Havana, Cuba, a concrete jetty of the system which we had proposed. The consulting engineers are in New York. One of them, Mr. Percival Parsons, will show you the Cape Cod Canal in a few days. You can then ask him about this jetty at Havana. The ingenuity of the engineers has developed a method of handling tremendous blocks by machinery with no difficulty whatever.

The use of reinforced concrete for all the important works which the engineers have to carry on in the world to-day, at points where other methods of construction are difficult and very costly, places in our hands a most valuable tool for very important work, and I agree heartily with the proposition that there is here a question which ought to be discussed at the next Congress.

The Chairman. — Mr. Humphrey has the floor.

Mr. Humphrey (in English). — I would like to add a few words on the question of the action of sea-water on concrete. A number of observations of the effect of sea-water on cements and various compositions were carried on at Atlantic City by the United States Geological Survey. These observations have since been abandoned. The effect seems to indicate that frost was an important element in the disintegration of concrete in sea-water, and the result is that studies will be made in tropical sections, where there is no frost, and in the northern sections of our country where frosts are abundant. As the permeable character of concrete, is a mooted question, it would seem that, in discussing this question at the next Congress, some data should be gathered to throw light on the point whether the disintegration of concrete by sea water is not entirely due to the action of frost.

The Chairman. — Mr. Kennedy has the floor.

Mr. Kennedy (in English). — On the subject of wharf piers supported wholly on concrete piles, as distinguished from solid

piers, I desire to add to what has been said that I have designed a pier, now under construction, for the Government of Canada at Halifax, Nova Scotia, 800 feet long, 235 feet in width, to be built in sea water from 40 to 63 feet deep. The piles are in rows or bents 18 feet apart and each bent is braced with six brace piles. The piles are from 60 to 80 feet in length, all of them 24 inches square. They are now being moulded, and driving will shortly be commenced with a handling and driving plant which has been made especially for the purpose. We found no difficulty in securing contractors to undertake the work.

The Chairman. — Colonel Bogart has the floor.

Colonel Bogart (in English). — I may say, Mr. President, that I noticed a suggestion from some member of the Section that the question of reinforced concrete need be discussed only in connection with the effect of seawater upon it; but if he had been present at the discussions in the first section this morning, he would have seen that there are many conditions where, in connection with navigation, experience in regard to reinforced concrete is very important in inland waters. We are now facing it in certain structures, which I have to consider, and in which the question of alkali in the water, as is the case with some of the desert waters of our western and southwestern plains, is serious. There are, in these parts of the country, rivers in which we have to build dams and locks for navigation and it is a question what the result of alkali waters is to be on concrete, a question as important here as it is in regard to the sea.

The First Section, after having taken up and considered the interesting reports which had been treating reinforced concrete, and after a long discussion, considered that the employment of reinforced concrete held very considerable importance and that experience will permit, without doubt, a precise conclusion to be reached before long, and expressed the wish that *reinforced concrete shall be placed in the order of the day for the next Congress and shall be there treated as a "question"*.

The Chairman (in English). — The second Section will wish, undoubtedly, to vote a similar motion. It was worded as follows in the first Section :

" *The Section, after having examined the interesting reports published on the subject of reinforced concrete and after a long discussion,*

" *WHEREAS the use of reinforced concrete is one of great importance, and,*

" *WHEREAS the experience acquired will soon permit an exact conclusion to be reached,*

" *RESOLVES that reinforced concrete be placed on the order of business of the next Congress and that it be there treated as a question. "*

Mr. Bubendey (in German). — Reinforced concrete is, evidently, something of capital importance both for maritime works and for works of inland navigation. This being so, I move that : *the Permanent Board of the Association of Congresses of Navigation place this very subject on the order of business of both Sections of the next Congress as a " question ", and that it be discussed at a general session of both Sections.*

The Chairman (in English). — We have now to examine *the third communication* on our programme, entitled:

Bridges and ferry bridges; tunnels under waterways used for ocean navigation. Economic and technical study.

This communication has been treated in the reports presented to the Congress by : Mr. Wendemuth (Germany), Messrs. Zanen and Descans (Belgium), Mr. Lindenthal (United States), Mr. Babin (France), Mr. Forti (Italy), Mr. Rojdestvensky (Russia) and Mr. Nilsson (Sweden).

As I do not see Mr. William Burr, the General Reporter on the communication, I shall call on the other Reporters.

Mr. Bubendey, who takes Mr. Wendemuth's place has the floor.

Mr. Bubendey (in German). — Allow me, in Mr. Wendemuth's stead, to explain in few words why the city of Hamburg was led

to build between the two shores of the Elbe a *tunnel equipped with lifts and with two passages*, each one of the latter insuring the movement of pedestrians and teams in a given direction.

On account of the intense maritime circulation, the width of the Elbe was not sufficient for carrying teams across the river on large ferryboats. Then too, the shores were not high enough for a bridge with a floor well up in the air. The car of a ferry bridge would have been a source of danger, especially during fogs, if the traffic which exists on the river be taken into account. A tunnel with inclined approaches would have cost twice as much, at least, as the 10,000,000 marks which the tunnel with lifts cost. Moreover, such a tunnel would not have put the shores of the waterway in direct communication, and the heavy teaming would have been very hard for horses on the approaches.

According to the experience obtained at Hamburg, the cost of building, by means of a shield, a tunnel having only one passage with a single carriage road, and a sidewalk on each side, can be estimated at \$1,100 to \$1,500 per running metre, according to local conditions but exclusive of the arrangements required at the ends. The Hamburg tunnel has met fully all the demands made upon it. The circulation of teams is interrupted occasionally, and during these spaces of time all the lifts are used for carrying foot passengers up and down. There can then be passed from 8,000 to 10,000 persons an hour from one shore of the Elbe to the other. It is possible that another tunnel, with inclined approaches for the service of tram lines, may be built further on.

The Chairman. — Mr. Ganem has the floor.

Mr. Ganem (in French). — We find on page 20, paragraph 1, of the general report, the following:

“The swinging bridge incumbers the pass *less* during its manœuvres than “does the bascule bridge,” whereas in the report which I prepared in conjunction with Mr. Descans we say just the contrary (page 17, paragraph 2).

I request that this rectification be noted.

The Chairman. — Note will be made of the correction.

Mr. Bâtard-Razelière has the floor.

Mr. Bâtard-Razelière (in French) recalled and summed up the conclusions of the report of Messrs Babin, Coblenz and Martiat by pointing out that these authors left out intentionally the system of crossing by means of ferry boats, a system which is certainly interesting but which belongs rather to the floating stock for the operation of ports, and which does not seem to come exactly within the scope of the question as stated. He called attention to the fact that, among the works used for crossing maritime passes, movable bridges are much the most numerous. The size of these works is constantly increasing by reason of the greater dimensions of ships and of the growing needs of circulation on land. It is not rare at the present time to see movable bridges called upon to carry drays and railway trains at the same time and to cross channel ways of 50 and even 60 metres in clear width. It follows from this that it is becoming more and more difficult to study out the arrangements for such works. Hence it would be very useful for engineers *to have the question before us limited to movable bridges and retained on the order of business of the next Congress, but confining the study to the technical dispositions of the floor and the manœuvring apparatus and to the costs of construction, maintenance and working.*

The Chairman. — Mr. Rojdestvsky has the floor.

Mr. Rojdestvsky (in French) said that he agreed with the conclusions of the General Reporter, but he would like the indication of the width suppressed in the sixth of these conclusions, as he deems it useless. In his opinion, paragraph 6 of the said conclusions should be changed so as to read as follows: "Movable bridges may be used for crossing maritime channel ways *when* the movement of seagoing vessels is not sufficiently intense to prevent closing these bridges for a time sufficiently long for the needs of the road's service."

Mr. Barrillon (in French) observed that the General Reporter must have had the width of the channel way in mind and that the suppression requested was not necessary.

The Chairman (in English). — Are there any further remarks?

There being no reply, the Chairman announced that the discussion was closed.

The Chairman (in English). — The time has come when we shall have our closing exercises. I have a memorandum here which I would like to read to you, the members of the second section of the 12th International Navigation Congress.

Your labors have now come to a close, you have discussed the important subjects of this Section and have recorded your decisions upon the "Questions" and have importantly amplified the informations contained in the "Communications". Your President wishes to thank you most sincerely for your constant attendance, the interest you have shown, and for your co-operation in making the proceedings of this Section a success.

I wish to interject a remark that the General Vice President of this Congress, Mr. Thierry, has stood right by me during all this session and voluntarily and very willingly assisted me as have also the other vice-presidents and secretaries.

Your discussions, published in the general report of the Congress, will form an important addition to the 60 or more reports of the Second Section which have formed the basis of our studies and discussions. The President most cordially expresses to the Vice-Presidents and Secretaries and to all who have assisted as Officials in these discussions, his appreciation of their valuable assistance, without which he would have been unable to preside over your deliberations.

The American members of the Congress hope to show to the members of the other countries some of the maritime and Great Lakes works and installations of this country; some are in exploitation and some in construction.

The information you will gather will supplement usefully the solid technical work you have done here. We are all assured that the work of this Section of the Congress, like that of its predecessors, will contribute to the good of the commerce, industry and well being of the world. (*Applause.*)

Mr. de Pulligny (in English) Mr. President : I have been asked to speak a few words in the name of the foreign delegates of all

nations; to thank the officers of this section, especially Vice President Thierry and yourself; Mr. Thierry whose assistance has been so useful for the understanding of this modern Babel tower, and yourself for the high science, the impartiality and care which you have displayed while sitting in the chair during these discussions. It is certainly most pleasing that, on account of these eminent qualities, the discussions of the section have been made agreeable, useful and beneficial to all members. (*Applause.*)

Mr. de Roummel (in English). — Mr. President, and Gentlemen: We have here discussed different subjects and made conclusions which will be, there is no doubt, of great value for all ocean and sea navigation engineering. We have had here the possibility to make the acquaintance of many very distinguished American engineers and promoters of the marine navigation. Our amiable hosts have already given us and will give us in the next future the chance to make ourselves acquainted with the results reached by the American genius and American energy in respect to ports and water ways.

Allow me, gentlemen, in my quality of former President of this section at the 11th International Congress in St. Petersburg, to express on behalf of foreign members here, our deepest thanks to the right honourable President for the great ability and the most correct leading of our discussions.

I wish also to express our thanks to the Secretaries, General Reporters and all our American colleagues, of this section, whom we expect to meet at the next International Navigation Congress. (*Applause.*)

The Chairman. — My honoured associate at my right wishes me in his name also to thank you for your kind words to him. I think that is the wish of all my associates at this table before whom you have given your valuable attention. We have done the best we could from the highest to the lowest, and the lowest to the highest, to make the work of this Section a success, and we now stand ADJOURNED to the next Congress wherever it may meet.

PROCEEDINGS
OF THE
SECOND GENERAL MEETING
(FINAL MEETING)

Tuesday Morning May 28, 1912.

The closing ceremonies of the XIIth International Congress of Navigation were opened at 10,30 o'clock in the great Ball Room of the Bellevue-Stratford Hotel, under the Presidency of Brigadier General William H. Bixby, Chief of Engineers, U. S. Army.

There was a large attendance of delegates and members; many ladies occupied the boxes which had been reserved for them.

The foreign members of the Board of the Congress, the members of the Boards of the Sectional Committees and the delegates of the foreign Governments had taken their places on the platform. At the table were seated :

Mr. de Timonoff, Acting President of the Permanent International Association of Congresses of Navigation; Colonel John Bogart, Civil and Consulting Engineer, Chairman of the First Section; Mr. E. L. Corthell, Civil and Consulting Engineer, Chairman of the Second Section; Baron von Coels von der Brügghe, Assistant Secretary of State; Mr. Charguéraud, Councillor of State, Inspector General of the Ponts et Chaussées; Mr. Vandersleyden, ex-Minister of the Waterstaat; Professor de Thierry, Geheimer Baurat; Lieutenant-Colonel Sanford, Secretary General of the XIIth Congress of Navigation; Mr. Richald, Secretary General of the Permanent International Association of Congresses of Navigation.

Brigadier General Bixby called the meeting to order and opened the session with brief remarks, introducing the various speakers

Brigadier General Bixby said :

Ladies and Gentlemen,

Because of his great facility in all of the three official languages of the Association, the executive committee has delegated to Mr. de Thierry the duty of reading the conclusions which have been formulated and accepted in the sections, and endorsed by the committee of the Congress, upon all the questions discussed at this meeting.

As this Congress is the first one to be held in the United States and as there are a great many new members present, especially from the United States, who are not well acquainted with the general methods of the Congress, I take the liberty of adding here a few words of explanation of the methods by which the conclusions have been formulated.

In order that the work of the Congress shall give best results, it is not of such great importance to obtain definite conclusions as it is to have the questions discussed fully by the best authorities, then reviewed by able men of each department of work concerned, then to be commented upon at the meetings of the sections by those who have prepared the original papers and by any others present at the meetings who may have valuable views to offer and comments to make, and finally to have all of these matters put into print so that they can be read quietly at home by each member of the Congress after the active work of the Congress is finished. At this present meeting, after the verbal discussions were finished, the recommendations of the reviewer were finally discussed by all the writers and speakers on each question; and after the committee had decided upon such phraseology as represented most completely the views of all parties concerned, the final recommendation, after having been translated into all three official languages of the Congress, so that its reading in all three languages shall give as nearly as possible identical ideas to all who may read them in any or all of these languages, is published. What now remains to be done by the Congress as a whole is merely to decide whether the result is satisfactory to the Congress. As the moment has already passed for any changes except perhaps those of one or two words, by which to make the translation perfect, or by which to express

better the ideas which it is intended to have conveyed to the reader, you will be asked, after the conclusions as now adopted by the general committee of the Congress shall have been read, whether they are satisfactory, and then, if there be no serious objections raised, the question will be put as to whether the conclusions shall be adopted by the Congress; the vote in such case to be "yes" or "no".

By the by-laws of the Congress, the communications are never voted on in the sections and are not even read at the closing session.

We will commence with the **first section** which deals with **inland navigation** and I will ask Mr. de Thierry to read the conclusions upon its **first question**.

Mr. de Thierry :

1st QUESTION.

Improvement of rivers by regulation and dredging and, if needs be, by reservoirs. Determination of the cases in which it is preferable to resort to such works rather than to canalization or the construction of a lateral canal.

CONCLUSIONS :

1. Absence of any Exclusive Method. — *The navigability of rivers having but one current can be improved, as it has been stated many times at the Navigation Congresses, by various methods, such as : Regulation of the bed by permanent works; regulation of the bed by mechanical dredging; increase of depth by an additional water supply furnished by storage reservoirs; canalization of the bed; combined action of two or more of the above processes; construction of a lateral canal. The use of one of these methods rather than another depends upon the special circumstances of each particular case. Among these circumstances, the following are of prime importance : The nature of the river and of its navigation; the existence of objects of improvement other than that of navigability (more especially agricultural, power or sanitary purposes; protection of the banks in the interest*

of towns, protection against inundations), the degree of the navigability required, the importance of the expected traffic, the resulting cost of transportation, including interest on the cost of improvement, maintenance charges and the cost of carriage, money and time available to insure for the boating industry, on the line in question, the conditions of navigability sought, etc.

2. The impossibility of establishing, at the present time, fixed rules determining, a priori, the method which is to be preferred in any given case. — While stating that the different methods used for the improvement of river navigability have given satisfactory results and reached their purposes under the special conditions, in which they have been applied, the Congress finds, that it would be premature to try to establish, at the present time, fixed rules determining, a priori, the method to be preferred in any given case, inasmuch as the classification of rivers from the standpoint of their nature and of their navigation is yet to be accomplished.

3. Necessities for Studies. — If there be no general method for improving the navigability of rivers which is applicable to all rivers, and if the selection to be made be always governed by circumstances and remain a question of kind, each process can be perfected and made more suitable for rivers of a certain regimen. This makes it desirable :

“(a) That scientifically organized special studies be undertaken, by sundry nations, on rivers with different regimens, in order to observe the degree of navigability which it is possible to attain by the applications of various methods of improvement and to determine the factors which govern the cost of the corresponding works;

“(b) That hydrotechnic laboratories intended for the study, on small scale models, of the life of rivers become of more and more extended use and that they be supplied with the means necessary to experiment with the various processes for improving the navigability of rivers and, in so far as possible, in connection with the studies and works carried out on the rivers themselves;

“(c) That the resolution of the Sixth Congress of Inland Navigation, voted at The Hague in 1894, be carried into effect, this resolution calling for taking up, in connection with rivers having but one current, the study of a short, clear formulary which shall

be sufficiently complete and shall include the information necessary to define the characteristics of every river studied, from the double point of view of its regimen and its navigation;

"(d) That the improvement of the navigability of rivers having but one current, completed by those of the laboratory experiments and of the formulary, be kept on the order of business of the next Congress of Navigation."

The President. — Gentlemen, you have heard the conclusions to the first question of the First Section, is there any objection? The conclusions are adopted.

Mr. de Thlerry :

2nd QUESTION.

Dimensions to be assigned, in any given country, to canals of heavy traffic. Principles of operating. Dimensions and equipment of the locks.

CONCLUSIONS :

1. *Standard dimensions for interconnecting canals, permitting interchange of traffic without trans-shipment, are desirable.*

2. *Practical harbor and trans-shipment facilities and the rapid circulation of the means of transport are as important for the economy of transportation as are fixed dimensions of canals and boats.*

3. *The waterway and its boats should receive progressively the improvement needed in order to continue to serve the traffic which it develops.*

4. *It is desirable, in order to develop the traffic on the canals, to employ trains of boats, towed by tugs or self-propelling boats. If the traffic becomes very important, special attention should be paid to regulating the movement of the boats.*

5. *For an important traffic, it is desirable to operate the locks with mechanical appliances. Special attention should be paid to facilitating the entrance and the exit of boats.*

The President. — There is no objection? The conclusions are adopted.

Mr. de Thierry :

3rd QUESTION.

Intermediate and terminal ports. Best methods for combining, facilitating and harmonizing the transfer of freight between the waterway and the railway.

CONCLUSIONS :

1. *The problem of combining, facilitating and harmonizing the transfer of freight between waterways and railways is partly administrative or governmental and partly technical or mechanical.*

The co-operation of railroads with waterways should be secured by the effective regulation of railroad service by national, state and local governments. The legislative and administrative requirements of the several public authorities should so supplement each other as to make a unified transportation system of the railroads and waterways in each country.

2. *It is essential that each port should be systematically organized for the accommodation of the traffic and the industries to be served. Experience shows conclusively the need of supplementing the use of privately developed terminals by the public ownership or control of the operation of wharves, docks, warehouses, and other harbor facilities for handling freights for public use. Exclusive private ownership of water terminals is indefensible.*

3. *The legislative and administrative measures to be taken to co-ordinate railroads and waterways, to unify and systematize port facilities and to provide an efficient harbor administration must vary with different countries.*

4. *The layout of intermediate and terminal ports and the mechanical appliances best adapted to the handling of traffic must be determined for each port separately and in accordance with its special requirements. Local city and state engineers must apply*

to the solution of local problems, and adapt to local conditions, the principles of port organization and operation which have been found effective at other ports and in other countries.

The President. — No one has any remarks to make?...

The conclusions are adopted.

The questions of the **Second Section**, relating to **ocean navigation**, will now be taken up.

Mr. de Thierry :

1st QUESTION.

Means of docking and repairing vessels.

CONCLUSIONS :

Graving docks constitute, in general, the most satisfactory solution of the problem of docking large vessels; but there are cases where floating docks only could be adopted, and others where they offer special advantages that give them the preference.

The President. — No one is opposed? The conclusions are adopted.

Mr. de Thierry :

2nd QUESTION.

Dimensions to be given to maritime canals. (Technical point of view. Probable dimensions of the sea-going vessels of the future.)

CONCLUSIONS :

In a maritime canal a wet section 5 times as large as the immersed portion of the largest ship which is to use the canal is

desirable, as also a depth of one meter under the keel; but these values are functions of the speed at which the canal is to be navigated and therefore to some extent also of the volume of commerce, and are to be determined by local conditions.

The President. — No one has any remarks to make?

Mr. Dondona has the floor.

Mr. Dondona. — I desire to say that, in my opinion, the conclusions to this second question cannot be of any great importance as they were adopted rather as a matter of courtesy to the General Reporter on the question, Mr. Grunsky.

The President. — Note will be made of your observation; the conclusions to the second question may be regarded, nevertheless, as adopted.

Mr. de Thierry :

3rd QUESTION.

Mechanical equipment of Ports.

CONCLUSIONS :

The Section recommends that the following question should be placed in the programme of the next Congress :

“Mechanical transferring of miscellaneous cargoes from the vessel's hold or from the vessel's deck or from the pier's side to all areas embraced within the terminal limits.

The President. — There being no objection, the conclusions are adopted.

Before going on, allow me to ask from you a vote of thanks in favor of Mr. de Thierry whose very important task, of reading the questions and conclusions in the three languages of the Congress, has been so admirably performed. (*Applause.*)

Ladies and Gentlemen,

The technical portion of the work of the Congress is now finished. Following the custom of past years, there remains for us only to listen, in succession, to the speakers representing each one of the countries of the Congress; and, still following the custom of past years, they will be called upon in the order of these countries according to name, using the alphabetical sequence given by the French language.

The first address will be by the Baron von Coels von der Brügghen, Assistant-Secretary of State in the Department of Public Works, representing Germany.

Baron von Coels von der Brügghen (in German.— Gentlemen : In the name of the Germans who have taken part in this Congress, I desire to express my warmest thanks for the brilliant welcome which we have received here. These thanks are offered to the United States as a nation, to the State of Pennsylvania, to the city of Philadelphia and to all the authorities whose valued assistance has permitted this Congress to be held here. And I thank also all the Americans of the general and special Committees whose assistance has given the means of bringing our reception to so successful an end. The days spent in Philadelphia will ever remain green in our memories.

Gentlemen, the Congress has ended in a series of important conclusions, and discussions of the highest interest have taken place at our sessions. But this Congress will also be important from another point of view. We have heard a great deal, of late years, about universal brotherly love on earth, and, if I do not believe that this ideal is to be reached in the near future, I think, nevertheless, that an international Congress held on American soil, where the combined efforts of elements belonging to so many nations have created such a powerful State, seems a particularly propitious occasion to strengthen and multiply reciprocal relations between peoples. The Ocean separates continents, but common work, wrought with a lofty aim and for the good of mankind, results in strong and peaceful bonds among the nations. (*Prolonged applause.*)

The President. — Mr. Matheusche, Director of the Imperial and Royal Warehouses of Trieste, delegate of the Austrian Government, has the floor.

Mr. Matheusche (in English) :

Mr. President and Gentlemen,

The Congress is over; good and useful work has been done. We have worked not merely theoretically in our meetings, but we have had also the opportunity to inspect practically waterways, harbors, technical installations and cities, showing everywhere the great commercial and industrial development of the country; still we have had some time for pleasure and entertainment. How could we manage to go through all our work in such a short time, in a few days? Are the days or the hours longer in America than elsewhere? No, they are not; we could only do it through the immense and most marvellous hospitality, we found on American soil! Let me therefore thank all who have contributed to this hospitality and address my most heartfelt and respectful thanks to H. E., President W. H. Taft and to the U. S. Government, to the Governor and the Government of the Commonwealth of Pennsylvania, to the Mayor and the City of Philadelphia. (*Applause.*)

The President. — Mr. Vanderlinden, Inspector General of the Ponts et Chaussées, Administrative Inspector of the University of Ghent and Delegate from Belgium, has the floor.

Mr. Vanderlinden (in French):

Mr. President, Ladies and Gentlemen,

Having the honor to represent the delegation from Belgium, I rise in my turn to add the thanks of that body to those which we have just heard uttered.

There is not one of us, Ladies and Gentlemen, who is not convinced of the usefulness of the debates of our Congresses.

Let me be allowed to mention a case in point. We found our-

selves confronted recently, in Belgium, by an exceedingly difficult problem in river hydraulics, the solution of which was to have a great influence on the development of our commercial metropolis. I refer to the works for regulating the Scheldt, which are to make such a vast improvement in the conditions for reaching the port of Antwerp and to make it accessible to the largest ships of the world.

Our Chamber of Representatives has just reached a unanimous decision, and, as a fervent adept of the Congresses of Navigation, I am deeply rejoiced in telling you that this decision is founded on the application of principles which have been set forth and defended so masterfully, at our successive meetings, by the most distinguished engineers.

Such facts make us testify most heartily to the expression of our common gratitude toward those countries which welcome our reunions and toward all those who, by their studies and their labors, help to make our meetings fertile in resource and fruitful in result.

The Congress of Philadelphia, especially, will remain fixed in our memories. In this land of America where, as Paul Bourget says, "the engineer is the great artist", we understand, by what our eyes have seen, the influence which his work has had on the advance of a civilization; it does more than follow and sustain it, it shows that it is able to conceive and create it.

I cannot leave this stand without thanking, with my whole heart, all the persons and all the organizations, whatever be their name, who have given such care and attention to the organization and preparation of this important Congress. I shall not attempt to name them all for fear lest one of them be omitted and I hear of it later. I shall merely join fully in what other and more able speakers than I have said in this respect.

Still, there is one organization which I ask to be allowed especially to mention. It is the Committee of the Ladies of Philadelphia which I mean.

Belgium is quite largely represented here by the fair sex, consequently her first delegate is well placed to appreciate what the Ladies Committee has done.

It is impossible for me to tell you how they have spent them-

selves and how prodigal they have been in their endeavors. They have literally covered their co-sisters of Europe with flowers and overwhelmed them with kindly attentions, and if there be one single reproach which I can bring against them it is : that they have carried their devotion to the ladies of the Congress so far as completely to forget themselves.

May they deign to accept here, by my voice, speaking in the name of all the ladies from foreign lands, the expression of our deepest gratitude.

And lastly, I express the wish that, even as the case has come up recently in Belgium, the United States of America and especially the State of Pennsylvania and the City of Philadelphia may find in the labors of our Congress, if needs be, the elements for solving problems in river hydraulics, such as to bring about the development of the ease and prosperity of their inhabitants. (*Prolonged applause.*)

The President. — Colonel Anderson, Chief Engineer at Ottawa, Delegate from Canada, has the floor.

Colonel Anderson (in English) :

I am pleased to be given the opportunity, on behalf of the delegates of the Greatest Dominion of the greatest maritime nation, of expressing Canada's appreciation of the important work which is being done by the International Association of Navigation Congresses, and to convey to this meeting the regret of the Honorable Mr. Hazen, Minister of Marine and Fisheries, Canada's Permanent Member of your Board, for his inability, in consequence of urgent official duties, to take part in your deliberations.

No one could have participated in the discussions of the past week, as we Canadians have had the privilege of doing, without being impressed with the importance of the Association and the wisdom of the general conclusions which have been reached. Many subjects in which Canada's Marine is vitally interested have been referred to the Permanent Board for discussion at the next Congress.

May I voice Canada's tribute of appreciation of the work of the American Officials in charge of this meeting, of the local

committees of entertainment, and, above all, of the kind offices of your Committee of ladies.

We Canadians have the geographical advantage over Europeans of oftener experiencing the delightful and spontaneous hospitality of the Americans of the United States, who during the past week have certainly proved that they are dwellers in a City of Brotherly Love. Apparently the only limit of their care for us has been the limit of our physical capacity to stand entertainment, and I can assure them that the Canadian Delegation will cherish this visit to Philadelphia as a delightful memory.

It is a matter of intense satisfaction to us that the relations between Canada and our cousins to the southward have always been so cordial. We are of the same stock, we speak the same tongue, think the same thoughts, and have similar aspirations, and the welfare and progress of the one country must parallel those of the other.

If we have lately been frequently reminded that a certain document, now historical, was evolved and signed in Philadelphia, we realize that each half of this continent has since grown to the stature of a great nation, united in the bonds of friendship, but each satisfied with its own destiny.

Possibly the large number of delegates from Europe, Asia, and Southern America have not had sufficiently impressed upon them, at our official meetings, Canada's maritime achievements and future possibilities; but our Government hopes that the excursion over a small portion of Canada's great waterways, which is projected in connection with this Congress, will give them an opportunity of enlarging their knowledge.

We can show them a large river carrying sea-going vessels into the heart of a continent, with the help of some sixty miles of improved channel; a very notable system of canals; one of the largest locks actually in existence; and a network of railways traversing the continent ahead of settlement, and making possible the transport of the products of an immense wheat growing area, through our navigational facilities, to the markets of the old world over the Atlantic Ocean, and to the Orient across the vast Pacific.

Gentlemen, all this and more we cordially invite you to come and see for yourselves, and I can promise you a welcome as

cordial, if not as impressive, as that which we have had from our present genial hosts. (*Great applause.*)

The President. — We will now hear from the gentleman representing Denmark.

Mr. Hummell (in English):

Mr. President, Ladies and Gentlemen,

As a delegate of the Danish Government, I take great pleasure in thanking you very much, for the honor of being able to do so. I present to you, to the Government of the United States with the thanks of my Country. I render thanks to the Vice Presidents and to the Commissions of the Congress and I wish to thank them and compliment them on the manner in which they have conducted this Congress. I should like to add that a great many of our people in Denmark have come over here, to this Country, as our Country is not large and people come over here. My countrymen are here in this Country and are well cared for. They have obtained employment and many of them have here found a new home and a good home. (*Applause.*) Therefore, I will thank the Americans and the American engineers. At least allow me to thank you for my countrymen for the kindness and hospitality we have found here. We will take home with us the best remembrances from this Congress in this Country, remembrances that we will never forget. (*Applause.*)

The President. — Mr. Brockmann, Chief Engineer of the Corps of Roads, Canals and Ports, at Madrid, Delegate from Spain, has the floor.

Mr. Brockmann (in English) :

Mr. Chairman, Ladies and Gentlemen,

On the part of the Delegates of the Spanish Government, it is my pleasant duty to express our appreciation of the manner in which the affairs of the XIIth Congress of Navigation have

been conducted and our thanks for the many kindnesses and friendly hospitality which have been shown to the Delegates during our stay in this beautiful and historical town, which has been so rightly called the City of Brotherly Love.

To the President of the Congress, to the Secretary General and to their Colleagues in the Committee, who have aided in the organisation and complicated business of the Congress, I render our thanks and compliments for the ability, and our congratulations for the great success which has attended their efforts.

To his Excellency the President of the United States, high Patron of the Congress, I pay our most respectful homage and to the Mayor of Philadelphia I offer our warmest thanks.

I desire also to express our hope and belief that the results arrived at in the course of these discussions will prove of the highest practical value and utility, and I address finally a hearty and fraternal greeting to all our Colleagues, from the different countries here represented, who have assisted at this Congress of which the only object is the welfare of humanity attained by the united action of Science and Labor. (*Applause.*)

The President. — Mr. Charguéraud, Councillor of State, Inspector General of the Ponts et Chaussées, Director of Roads and Navigation at Paris, Delegate from France, has the floor.

Mr. Charguéraud (in French) :

Mr. President and Gentlemen,

A long cherished dream is realized; a curiosity aroused many years since is fully satisfied; joys impatiently awaited are granted, then suddenly, all disappears.

Does it not seem to you that this Congress has only just been opened? and yet, we are gathered here today for our final meeting.

I will not believe that our American Colleagues, with that talent for seduction which is so essentially an art of lovely woman, have sought willfully a slow and methodic rousing of our desires.

Still, I really must recognize the fact that circumstances have

played singularly into their hands and that chance has done things better than could all imaginable womanly address.

Twelve years ago, at the Congress of Navigation held at Paris, after a special lecture which had already greatly aroused our attention, Mr. Ockerson, Member of the Mississippi River Commission, told us about the fine works which were going on here; then Colonel Millis, at a meeting just like this one, gave us to understand that the IXth Congress would be held, very likely, in the United States. The dean of the foreign delegates, whose fidelity to our Congresses had become a family tradition, the late Mr. Conrad, told us that he had had it confidentially from Mr. Corthell that all the necessary steps had been taken to hold the next Congress in America.

In 1902, we were at Düsseldorf and General Raymond, at that time a Lieutenant-Colonel, also said at the final session : "Come to America and you will receive there the most open and cordial hospitality."

In 1905, we were at Milan where we had the good luck to become acquainted with one of our presidents, Colonel Hodges, and our sympathetic Secretary General, Colonel Sanford.

There again we were led to believe that our hopes were very soon to be realized.

But, three years later we met at Saint-Petersburg, and this time it was clearly understood that the next Congress would be held in this beautiful country, the United States of America.

Again our hopes were to be partially deceived. America, like Galathea of the Latin poet, fled toward the willows, for it was decided in 1910, that, as an exception, the meeting of the Congress would be put off for a year and be held in 1912.

Was it then a deceptive mirage, and were we constantly to see the long desired end flee before us?

No, as here we are, and I note with pleasure that the XIIth International Congress of Navigation falls in no way short of those which preceded it.

Why?

This is owing to its Committee on Organization, to General Bixby, its President, to Colonel Hodges who assisted him so ably in his task and to our indefatigable Secretary General,

Colonel Sanford; to the members of the Committee : Messrs. Bogart and Corthell; nor shall I forget Mr. Hampton Moore.

You will allow me also, Gentlemen, to express my thanks to the Permanent Board and to its tireless Secretary General, Mr. Richald, who, with unwearying devotion and aided by his faithful assistants, has done all that he could to help on the organizers of the Congress held in America.

Yesterday evening, Gentlemen, I did not forget to offer to the Committee of Ladies the meed of praise which is their due, and to-day it will suffice for me to second the words of Mr. Vanderlinden, who, vastly more than I, is in position to appreciate all that the ladies of Philadelphia have done for their sisters from foreign lands. (*Loud applause.*)

The President. — It is now the turn of Colonel Yorke, Chief Inspector of Railways, and Delegate from Great Britain.

Colonel Yorke (in English) :

Mr. President and Gentlemen,

I thank you for giving me the opportunity of speaking at this closing session of the Congress of Navigation of 1912. I believe that I am voicing the feelings of every member of this gathering when I say, that we feel sad at the prospect of bidding you farewell. I desire to take this, the first opportunity at my disposal, to thank you on behalf of my country and myself for the magnificent welcome accorded to us by the American nation, by the State of Pennsylvania, and last, but by no means least, by the City of Philadelphia. We were particularly flattered by the personal greeting of the President of the United States, who honored us by his presence at the opening session of the Congress. This is not the first Congress that I have attended in the United States and I sincerely hope it will not be the last. I have also attended similar gatherings in other countries and I think I may say that a more agreeable meeting it has never been my luck to witness than this present one. Everyone, from the highest to the humblest, has gone out of his way to make us feel at home. I am sometimes asked what is the use of the gatherings

of this nature. I think it will be admitted, by scientists and philosophers, that a gathering of several hundred people from all parts of the world, everyone of whom has his thoughts concentrated upon one subject, though perhaps regarding it from a different point of view, cannot fail to have a considerable influence upon the development and evolution of that subject. Each one of us has received or imparted, perhaps unconsciously, some new impression. The results may not be immediately apparent. The impressions will perhaps lie dormant for a while but, sooner or later and in some way or other, they will take shape and whenever the subjects of the equipment of docks or of harbors, the improvement of waterways and the future of navigation on inland waters arise, they will be influenced by the discussions and the exchange of views and opinions among the delegates to this congress. If I may say so, I sympathize wholly with the desire of the City of Philadelphia, to make fuller use of the magnificent waterway at her door, and I trust that, in some way or other and in the near future, this gathering will prove to have served some useful purpose in the realisation of her dreams, either by suggestions made in the course of the discussion or else by focussing attention upon this great problem. If any justification is needed for meetings, such as the present one, the great philosopher Bacon says : "reading maketh a full man, conference a ready man". Mere book learning, however useful and necessary, will not of itself enable a man, still less an engineer, to grapple with all the problems that, from time to time, are certain to confront him. An exchange of opinion between man and man and the personal influences thereby transmitted, and, above all, the inspection of some of the great works, which are either in progress or completed, are needed to fire the imagination and enable the student to put his theoretical knowledge into practice; for the opportunities you have given us of educating ourselves in this manner, I tender you my hearty thanks. (*Applause.*)

The President. — Mr. de Kohanyi, Senior Inspector of Maritime Navigation in the Ministry of Commerce at Budapest, Delegate from Hungary, has the floor.

Mr. de Kohanyi (in English) :

Ladies and Gentlemen,

It is not only a duty, but also a great pleasure to address you in the name of the Royal Hungarian Government; I have to thank you in its name for the cordial and hearty welcome, for the unparalleled hospitality afforded to the Congress; especially I have to thank H. E. the President of the United States, the Governor of Pennsylvania and the Mayor of Philadelphia, the Presidents of the Congress and last, but not least, the President of the Local Organizing Commission the Hon. Hampton Moore.

It is impossible to mention all the Gentlemen who did their best for the success of this Congress, but I think I must mention the name of a Colleague of ours, who took the initiative steps, that the XIIth Congress could be held here, in Philadelphia, I mean my old college friend—he will allow me this epithet—the Secretary General of the XIIth Congress, Lieutenant-Colonel Sanford.

I think he was the man, who succeeded to find out between his fellow-citizens those Gentlemen, who were really interested in our works and so it is partly due to his zeal, that this Congress—the first one in America—can be regarded as an unparalleled success.

In thanking him especially, I can only assure you once more, that this Congress will be not only a markstone in the history of our Association, but even a markstone in the life of everybody, who was happy enough to be able to attend it. (*Applause.*)

The President. — We shall now listen to Mr. Inglese, Senior Inspector of Civil Engineering, Delegate from Italy.

Mr. Inglese (in English) :

Mr. President, Gentlemen,

Italy, politically speaking, is a young nation. Only fifty years ago, she was only a geographical expression, she had no unity, no independence, no liberty, very little money!

During those fifty years she has been striving hard, and working and fighting in order to have among the nations the place to which she was entitled by her noble traditions, by her glorious history, by her geographical position.

Since that time, Italy has followed the scientific movement of the world, she has sent her civil engineers to nearly every part of the civilized globe to learn what other nations were doing to improve their railroads, their waterways, their harbors.

Italy has attended the various Congresses held all over the world in the last forty years and was able to hold Congresses herself. I refer principally, concerning our Association of Navigation Congresses, to that held in Milan in 1905.

The amelioration of our harbors and our waterways was the principal reason which prompted us to see what other people were doing, with special aim to the improvement of our communications across the Ocean, for which we planned harbors for the accommodation of the largest ships.

We understand pretty well that *the seas but join the nations they divide*.

We are perfectly aware of the ever increasing dimensions of ocean going vessels and we have designed our harbors having in view that fact which is no more a subject of doubt, it is a certainly.

We came here, at least those of us who landed for the first time in free America, prepared to find and to see great things, prepared to admire the marvellous organisation, the marvellous energy of American people; but all our expectations have been surpassed by the real facts. We have admired, we have learned much, but the hearty reception of this city of Brotherly Love, will never be cancelled from our hearts.

We did not feel as if we were strangers here, at a distance of nearly 4000 miles from our fatherland, and in the name of any countrymen here present and of the Government which we represent, I give my most heartfelt thanks to the citizens of Philadelphia and to her beloved Mayor, wishing to the noble city an ever increasing prosperity.

To the Local Organizing Commission of this Congress and to its President, Hon. J. Hampton Moore, I feel grateful and thank-

ful, to the Ladies Committee, to Gen. Bixby, to every one who contributed to the great success of this Congress, our best thanks.

We regret that we are obliged to leave too soon this wonderful land, but I am sure I cannot stay from coming back to have more time to admire the energy and the progress of this wonderful American nation. (*Applause.*)

The President. — Chief Engineer Harada, Delegate of the Imperial Government of Japan, has the floor.

Mr. Harada (in English) :

Mr. President, Gentlemen,

On behalf of the Japanese Delegates I desire (to add a word to what has been said by my worthy predecessors in speech in the way of giving an expression) to assure you of their high appreciation of the distinguished patronage with which many prominent officials and citizens of this country have honored this XIIth International Congress of Navigation.

The fact that the Congress has been held in this country means to us Japanese delegates perhaps somewhat more than it does to others; for this Country is the home of Commodore Perry whose beloved name is so well known in our country. It was the memorable visit the Commodore made to Japan, in a small ship in our present sense, that opened a way for us to modern progress, and we have since learned many western arts and sciences. But the knowledge we have thus acquired is still limited and we have a good deal more to learn from you. So I believe that our country is much more indebted to the Congress than any other represented here.

In Japan, we are now improving the harbors of Yokohama, Kobé, Osaka, Touruga, etc., as well as the Strait of Shimouoseki. Also we have improved some of the larger rivers and are executing in many others certain plans for flood protection works. We are in the hope to be able, in the near future, to present some results of investigations in regard to these works and thereby fulfil a part of our duties to the Congress. It is our hope that, if any of our colleagues assembled here visit Japan, they would be good

enough to see some of our works and give us their friendly advice and suggestion, which would be highly valued by us.

In conclusion, in the name of the Japanese delegates, I thank the United States, whose hospitality we are still enjoying, for their invitation to this Congress. I also desire to offer our warm salutation to this great historical and glorious city of Philadelphia, and express our appreciation of her special cordiality. And lastly, I must not forget to thank the permanent and temporal officials of the Congress for the part they have so ably filled in effecting our XIIth session, as one of the most successful meetings.

Gentlemen, congratulating the success of this Congress, and thanking you for the friendship with which you have honored us, and wishing to meet you again—you, all the eminent men of the world who are very faithful to science and to the welfare of the world—allow me that I say you farewell in Japanese, “Sayonara”. (*Applause.*)

The President. — Mr. Batard-Razelière, Chief Engineer of the Ponts et Chaussées at Marseilles, Delegate from the Principality of Monaco, has the floor.

Mr Batard-Razelière (in French) :

Mr. President, Gentlemen,

While the Principality of Monaco is the smallest of the States represented at the XIIth Congress of Navigation, it is, none the less, one of those which receive the greatest number of visitors from abroad, by reason of its privileged situation on the “Cote d’Azur”. The port of Monaco, which has been only recently created and which is accessible to most of the large ships which frequent the Mediterranean, will be able to develop still further its relations over a road which is most dear to the reigning Prince, that of the sea, on which he has carried out so brilliantly his laborious career as a man of science. H. S. H. Prince Albert follows, therefore, with special interest the remarkable labors of the Congresses of Navigation and it is a great honor for me to transmit his best wishes for the success of the XIIth Congress together with his thanks to the Federal Government, the State of Pennsylvania and the City of

Philadelphia for the generous hospitality which they have been so kind as to offer to the meetings of this Congress. (*Applause.*)

The President. — Mr. Kristensen, Director of Navigable Highways and Delegate from Norway, has the floor.

Mr. Kristensen (in German) :

Ladies and Gentlemen.

As the representative of Norway, the land of waterfalls, I desire to express all my thanks for the amount of labor accomplished through the organization of the XIIth Congress of Navigation, the consequences which it will bring forth are great.

I seize the opportunity offered to me to express the hope that the First Section of the Congress may make, later on, a detailed study of the important question of knowing in what way hydraulic forces may be utilized in the construction of navigable highways.

There is a close connection between the subjects treated by the Congress and the utilization of hydraulic forces, and that, not only from the operating point of view, but also from that of the technical construction of the works. I dare hope that, some time in the future, a favorable solution may be found for this important question. (*Applause.*)

The President. — Captain Ferraz of the Navy, Delegate from Portugal, has the floor.

Captain Ferraz (in French) :

Ladies and Gentlemen,

I must admit that I am not prepared to speak before a company composed of the most distinguished engineers in the world, but, as the only representative of Portugal, I consider it my duty to say a word to you.

Portugal was formerly great on the sea; it was she who opened to navigators the ocean routes to Africa, the Indies and America. Although a small country, Portugal possesses a long line of coast,

and ports in all parts of the world which still give her an important place among the colonial nations.

Portugal has been great through the sea and I believe that it is through the sea that she will continue to shine in the future.

Under these conditions, the labors of this Congress are of great importance for my country, and by them will its sea ports, especially, profit.

So, I must present my regards to those who have laid articles and reports before the Congress and express to them the same feelings of gratitude as those which have been heard from other speakers. I cannot help adding that everything which I had heard said about American hospitality is far below what I have met with in Philadelphia and that I shall always cherish most beautiful memories of the days spent in this splendid city, and crying out : long live the City of Brotherly Love! (*Applause.*)

The President. — Mr. Vander Sleyden, ex-Minister of the Waterstaat, Delegate from the Netherlands, has the floor.

Mr. Vander Sleyden (in French) :

Mr. President, Ladies and Gentlemen,

It makes me happy to say a word which shall express all the pleasure felt by my countrymen and myself at finding ourselves among you in America, in the Great Republic of the United States, where the rapid growth of the population and the enormous extent of the country have given birth to needs of wholly extraordinary proportions and kinds.

We admire the intelligence and perseverance wherewith are followed up the solutions of the many questions which force themselves on the attention and which, all, have as their ultimate object the well being of the entire population.

A mere examination of the means of transportation, and of the development of manufactures and commerce would have been already sufficient to excite our enthusiasm, but, on the other hand, we are overwhelmed here by so much kindly care, so much forethought, so much courtesy, that it is an agreeable duty for me to testify to all our gratitude toward the Government of the United

States, which desired that our reception should take place with such broad hospitality, and toward the Chairmen and Members of the Committees who undertook to carry out everything on so great a scale.

And yet, I should leave half of my task undone if, in behalf of the ladies who accompany us and who long to see and learn how things are done in this very beautiful and interesting land, I did not speak warm words of thanks to the Committee of Ladies organized to receive them and be their guides, and who have displayed a zeal and devotion far surpassing everything they had dared to hope for. (*Lively applause.*)

The President. — We shall now listen with interest to Lieutenant General de Schokalsky of the Imperial Navy, Delegate from Russia.

General de Schokalsky (in English) :

Mr. President, Ladies and Gentlemen,

I am very happy, as one of the delegates of the Russian Empire, to congratulate, in the name of our country, the American people and especially the Philadelphians and the authorities of this hospitable town, which have provided us with the opportunity to do some good work and achieve notable results.

The success of these Congresses and the progress made in furthering the best interests of navigation, have depended almost entirely upon the admirable arrangements made by the Organizing Committee for the conduct of the business of the Congress and the personal comfort and pleasure of the members.

It is interesting to note that the two last Congresses, those of 1908 and of 1912, were held in the most extensive countries of the Northern hemisphere, countries where the inland navigation is of very great importance. But, being also the only two countries of our hemisphere which touch the shores of two Oceans, these countries cannot be indifferent to navigation of the high seas, and at the previous session of the Congress at St. Petersburg, the questions respecting the general security of navigation in the widest understanding of the word, were discussed and resulted in the expres-

sion of a desire to hold a new Maritime Conference, and this finally brought about the Maritime International Conference held in St. Petersburg in the spring of this year. The results of that Conference have been communicated by myself to the Congress.

Certainly this good beginning should lead to substantial and lasting benefits to all nations, the thanks for which are due to the activity of the Congresses of Navigation.

I hope that our meeting here, in this splendid Country and City, will give a new impetus to our work, which began under favorable auspices in St. Petersburg, and has made such big strides forward, under the Patronage of this good City of Philadelphia, toward extending and strengthening the security of navigation to the benefit of the people of the United States and indeed of the whole world. (*Applause.*)

The President. — Colonel Hansen, President of the Royal Administration of Hydraulic Motor Powers of Sweden, Delegate from the Swedish Government, has the floor.

Colonel Hansen (in English):

Mr. President, Ladies and Gentlemen :

On behalf of the Swedish Government Delegates and of the other Swedes who have been partaking in this Congress, it is my chosen duty to express our sincerest thanks for these splendid days, and for the extreme kindness and the generous hospitality which have been extended to us during them.

His Honor, the Mayor of Philadelphia, has reminded us—in his brilliant speech at the opening session—of the close relations between the German nation and the inhabitants of this country. I want to recall to your minds, Ladies and Gentlemen, that millions of Swedes too have settled in the United States and have been loyal and laborious citizens of this great nation, and that, at this very place, the Swedes were the first European settlers about three hundred years ago, forming a colony named New Sweden.

I think we Swedes have always rejoiced in those close connections when visiting the States; at any rate, we have specially felt it so this time at this place. We really have felt at home here. And

this sentiment has increased, our hearts have beaten more rapidly when we saw that the bright yellow and blue flag of Philadelphia carries the same colours as the flag which flutters in the wind above the homes in our beloved old Sweden. Perhaps the next Congress of navigation will meet in our country. It is our hope that so it will be, and that we may be able to return a part of the generous hospitality which our American friends have extended to us by our hosts of to-day.

To the Chairmen and members of the Commissions and Committees, which have in such a brilliant manner organized this Congress, to the kind and hospitable inhabitants of this prosperous city of the powerful Commonwealth of Pennsylvania and of New Jersey, and of the glorious U. S. A. our most sincere, most heartfelt thanks! (*Applause*).

The President. — Finally, I desire to present to you Mr. de Timonoff, Professor of the Institute of Engineers of Lines of Communication, etc., etc., who is acting as President of the Permanent International Association of Congresses of Navigation.

Mr. de Timonoff (in English):

Mr. President, Ladies and Gentlemen:

I felt very highly honored by the invitation of the Permanent Board of the International Association of Congresses of Navigation to act as President of this Association during the session of Philadelphia. I felt so not only because these Congresses have long ago passed beyond the stage of experiment—and being an established and a permanent Institution they commend themselves to the practical interests of the public at large,—but because I knew that the XIIth International Congress of Navigation which was to be held in this marvellous country had before it the certainty of an unsurpassed success.

These anticipations are now fully realised. Prepared with the utmost care by the combined efforts of the members of the Organizing Commission and patronised by so many distinguished Americans with His Excellency, President Taft, as Chief Patron, the XIIth International Congress of Navigation has proved a magni-

ficent piece of international work which will leave behind it important "footprints on the sands of time". On behalf of the International Association for Congresses of Navigation I welcome these beautiful results of our meeting in the United States, and I congratulate the members of the XIIth Congress who have come from so many places to exchange ideas and arguments upon the matter of navigation which is of the deepest interest to the civilized world. They have brought their ripe judgment and experience, and practical knowledge to bear upon so many important questions and the consequences of their deliberations cannot but be of the greatest value to the whole brotherhood of nations.

In these days when we are so often told that the peace of the world is more or less threatened by the condition of armed expectancy in which so many nations feel it necessary to maintain themselves, I think, I may congratulate you all, that we have held under the American Stripes and Stars one of those meetings which tend to dissipate international prejudices, remove misunderstandings, stimulate good will and promote free and cordial intercourse between nations. Let me address the most respectful and deep thanks of the Association of Congresses of Navigation to the American People, to His Excellency President Taft and to the Government of the United States. Let me also thank in the heartiest way the Government of the State of Pennsylvania, the City Government of Philadelphia, the Organizing Commissions, the authors of reports, the general reviewers, the three boards of the Congress, and, in general, all who, in one way or another, have contributed to the final success of our convention. A special recognition is due to the citizens of Philadelphia, who have taken no small trouble to provide us a real American welcome, and to the press of this country which has paid to our work so much of its competent and benevolent attention.

I am confident that, when this Congress is over, those who took part in it will carry away with them pleasurable recollections of many objects of interest in this neighborhood beside those of the work in which they met more especially to take part. I am not quite sure that you will be equally satisfied with the action of the Permanent Board of our Association for allowing me to tire you with the remarks I have ventured to make on different occasions

and to which you have listened so patiently. But I have only to add my sincere wish that this Congress may result in permanent benefit to all nations and to the happiness of the whole world. (*Great applause*).

The President then declared the Congress closed in the following terms :

Ladies and Gentlemen,

Before we separate, I wish to express publicly the regrets of all for the enforced absence of the First President, Gen. Raymond, who hoped, up to last month, that he might be with us. His oculist however forbade his leaving the hospital. I am happy to say, however, that Gen. Raymond is likely to recover his eyesight and will be able to be at the next Congress. (*Applause.*)

The work of the XIIth Congress of Navigation is now ended. I am sure that in your opinion, as in mine, it has been a great success. In closing let me express again briefly for the Congress, its thanks to the eminent men who have read papers and joined in the reviews and discussions, to all the Presidents and Vice-Presidents and Secretaries of the Congress and of its sections. Let us thank also all of our Hosts and Hostesses of America, of the United States, of Pennsylvania and especially of Philadelphia, for the pleasure which they have given us. When we separate, we will do so feeling grateful for the pleasure of having met and feeling certain that our meeting has established friendships which will last forever, and, I am sure, hoping that the XIIIth Congress will see us all once more reunited. With these hopes and saying "au revoir", I declare the XIIth Congress of Navigation finally closed. (*Prolonged applause.*)

The Meeting adjourned, *sine die*, at 12,30 p. m.

ENTERTAINMENTS AND EXCURSIONS



SCHUYLKILL RIVER, SHOWING BASCULE BRIDGE AT PASSUNK AVENUE, PHILADELPHIA

Photograph by William H. Rau.

Entertainments and Excursions.

As these were quite numerous and extended over a considerable time during and after May 22nd to June 18th — it will be necessary to describe each somewhat briefly, though we shall endeavor not to omit any of the important features.



— Itinerary followed by Members of the Congress during their excursions.

Luncheon offered by the Local Organizing Commission to the members of the Permanent International Commission of Navigation Congresses.

Following the meeting of the Commission in the morning, (the Minutes of which are given in a separate publication issued by the Brussels office) a luncheon was served in the Red Room of the Bellevue-Stratford Hotel. Those present, beside the Commission members, included their collaborators, the Officers of the Local Organizing Commission, members of its Executive Committee,

representatives of the State and City Governments, and others, about 60 in all.

As an automobile trip to one of the industrial districts of Philadelphia had been arranged at 3 P.M., it had not been intended that there should be any formal speeches. A few gentlemen were, however, asked by Hon. J. Hampton Moore, President of the Local Organizing Commission, who presided, to speak briefly. Hon. Rudolph Blankenburg, Mayor of the City, gracefully welcomed the Congress in a few words, promising to speak at greater length at the opening session on the following day. He was followed by Mr. V. E. de Timonoff, Acting President of the Association, who referred to Mayor Blankenburg as having had charge of the two vessels sent from Philadelphia during the Russian famine some years ago. He spoke in terms of the highest appreciation of the assistance rendered by Philadelphia at that time, and said that he could not come to a port in which he would have a deeper interest than in that of Philadelphia. Hon. Samuel W. Pennypacker, former Governor of Pennsylvania, made a brief address of welcome in English, French and German. Brigadier General W. H. Bixby, Chief of Engineers, U. S. Army, General President of the Congress, spoke of the universal benefit that would result from the work of the 12th Congress. This Congress, he said, was not for the advantage of any one nation, but was world-wide in its benefits.

Automobile trip to certain points of interest. Independence Hall, Penn Treaty Park, and mill district of Philadelphia.

This trip was participated in by about 250 members and delegates, including ladies. It was offered by the Kensington Board of Trade, an organization composed of business men of the northern mill district of Philadelphia. Starting at about 3 P.M. the automobiles proceeded first to Independence Hall, on Chestnut Street near 5th Street. This building is of much historical interest to Americans for the reason that here was signed, on July 4th, 1776, by representatives of the thirteen original English Colonies, the Declaration of Independence declaring these Colonies independent of Great Britain. The party was shown the various parts of the



MUNICIPAL PIER, CHESTNUT STREET, PHILADELPHIA

TO THE
ASSISTANT
SECRETARY

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building and the historical relics preserved there. The automobiles then proceeded via Market Street and Broad Street, passing the enormous plant of the Baldwin Locomotive Works, to Girard Avenue, thence via Columbia Avenue and Beach Street to the Penn Treaty Park, on the Delaware River, where William Penn signed the treaty with the Indians by which the latter relinquished the site of the present City of Philadelphia. The party then proceeded via Girard Avenue, 5th Street and Montgomery Avenue to the



Metropolitan Opera House, Philadelphia.

large hat factory of the John B. Stetson Company, where a stop of about one hour was made and this interesting plant quite thoroughly inspected. Souvenirs of the visit were presented by the Company. On the return the Bellevue-Stratford Hotel was reached at about 5.30 P.M.

Informal reception at the Mayor's Office, by the Mayor and his Cabinet.

This took place at 9 P.M. in the large reception room of the Mayor at City Hall, which was brilliantly lighted and decorated; and was attended by practically all the delegates and members who had thus far arrived at Philadelphia. Many ladies were present both accompanying the Congress members and the members of the Organizing Commissions. All the members and their ladies were received by Mayor Blankenburg and by the members of his Cabinet, composed of the heads of the various municipal departments. The evening was passed most pleasantly in informal conversation, and the occasion furnished an opportunity for the members to become acquainted with each other and with the local authorities.

Buffet luncheon at Bellevue-Stratford Hotel.

This luncheon was given on Thursday May 23 at 12.30 P. M. by the Local Organizing Commission in the Ball Room of the Bellevue-Stratford Hotel to the members of the Diplomatic Corps, the Government, State and City Officials, who had attended the opening session of the Congress, and to all the members of the Congress. The ladies of the Congress did not attend, as they had been invited to a more formal luncheon given them by the Ladies Auxiliary Committee. The time before the afternoon meetings of the sections being limited, no speeches were made.

Visit to special navigation exhibition at the Commercial Museum.

On the afternoon of May 23rd, the members were taken by automobiles to the Commercial Museum, located in West Philadelphia near the Schuylkill River and near the University of Pennsylvania. In one of the extensive buildings of this institution were exhibited the interesting models, maps, photographs, etc., listed in the earlier part of this report, which comprised models of the works

of the Panama Canal and of the New York State Barge Canal, some of these being working models; also models and plans showing the projected harbour and terminal improvements of the City of Philadelphia, and others showing various proposed city improvements. There was also seen a very interesting collection of models belonging to the Commercial Museum, of commercial ships in all ages made to a uniform scale, and therefore showing at a glance the relative size and capacity of the merchant ships of the ancient Egyptians, Greeks and Romans and of the various nations of Europe at different periods, in comparison with modern sailing vessels and steamers. The models were explained by engineers connected with these several works and the working models were operated. The other permanent exhibits of the Commercial Museum were also inspected.



Members of the XIIth Congress at Commercial Museum, Philadelphia.

It should here be stated that during the Congress a series of illustrated lectures were given at the Museum on the Panama Canal, New York State Barge Canal and the proposed Atlantic Intracoas-



Commercial Museum, Philadelphia.

Permanent Exhibition of Products of All Countries — Commercial Library and Foreign Trade Bureau.

tal Waterway, to which all the members of the Congress were invited and which were attended by many of the members.

All the members of the Congress and their ladies were invited by the Local Organizing Commission to attend a performance in the evening of May 23 at Keith's Theatre, which is the largest vaudeville theatre in Philadelphia; and about 300 accepted the invitation. The Manager, Mr. Jordan, had decorated the theatre quite elaborately with flags of all nations, and, as a special feature, introduced in the programme a reel of pictures recently taken showing the construction of the Panama Canal. These pictures were much enjoyed and it is understood that several copies of this film were afterwards made expressly for certain delegates who desired to retain them.

Excursion to South Bethlehem and the Anthracite Coal Regions.

This excursion took place on Friday, May 24th, and was in charge of Mr. W. E. Bernard, Chairman of the corresponding sub-committee of the Local Excursions Committee of the Local Organizing Commission. The party, composed of about 175 delegates and members, left the Market Street Terminal of the Philadelphia and Reading Railway Co. on a special train at 8.25 A. M. for South Bethlehem. On the way they were first shown the recently completed work for elevating the tracks of the Railway so as to avoid all grade crossings between the Terminal and Wayne Junction, a distance of about 5 1/4 miles. The cost of this work was about \$10,000,000 and was paid for partly by the Company and partly by the City. The train passed a number of important manufacturing plants in and outside of Philadelphia, and traversed a fine agricultural country with considerable historical interest. At South Bethlehem the party was met by Mr. Charles M. Schwab, President of the Bethlehem Steel Co., who, with Mr. E. G. Grace, Vice-President and General Manager and Mr. Thomas O. Cole, Traffic Manager of the Company, personally conducted them through the most interesting portions of the works, including the armour plate department, projectile department, forging department and others. Luncheon offered by the Company was served about

1 P. M. After luncheon Brigadier General Wm. H. Bixby, Chief of Engineers, U.S.A., General President of the Congress, expressed the thanks of the Congress members to Mr. Schwab for the many courtesies shown by his Company, to which Mr. Schwab briefly replied, expressing his pleasure at having had the opportunity to entertain so distinguished a body of engineers. He was followed by Mr. Emil de Hoerschmann, Counsellor of State and Delegate of Russia, who spoke as follows :—

Ladies, Gentlemen, and dear Colleagues,

Russia is one of the countries furthest away from the United States. There is a difference of seven hours in the time between St. Petersburg and Philadelphia.

But there are several parts of our country which are still much further away from America, and which are found on the other side of the globe. When it is mid-day at Philadelphia it is nearly mid-night at Irkutsk.

But notwithstanding this enormous distance our countries are not in many respects so far apart from one another. There is a common bond between them, and if we consider it well we see that that union is consolidated precisely by engineering. The great rivers to be spanned, the high mountains to be pierced, and the great lakes to be navigated are all points in common between the two countries, and especially between their engineers.

For this reason we, who are not Americans, take pleasure in the successful issue of your undertakings, which are of equal interest to our own country.

We have just visited magnificent works which are equipped, administered, and managed admirably and we shall have gathered useful technical information from these.

But apart from its scientific aspects, this visit has had very practical results, which has given us an excellent appetite to appreciate all the delicacies which are offered to us at this table. I raise my glass to the ever increasing prosperity of these admirable works, and to the health of their distinguished Manager, Mr. Schwab. (*Applause and cries of Hip Hip Hurrah !*)

The thanks of the local organizing Commission to Mr. Schwab for his hospitality were then expressed by Mr. Edward W. Drinker, Canal Traffic Manager of the Lehigh Coal and Navigation Co., Mr. George F. Sproule, Secretary-Treasurer of the Local Organizing Commission, and Mr. Bernard in charge of the excursion.



Anthracite coal breaker, Coaldale, Pa.

At 2.20 P. M. the train left South Bethlehem and proceeded up the valley of the Lehigh River, passing through the most important Portland cement district in the United States, following closely the line of the Lehigh Canal and affording many interesting views of the scenery of this portion of the Appalachian system of mountains. It arrived at the Coaldale breaker of the Lehigh Coal and Navigation Co. at 3.15 P. M. A thorough inspection of this breaker and of the other features of the mining plant followed, under the guidance of Col. Rollin H. Wilbur, Vice-Président of the Company, assisted by Mr. Drinker. The anthracite coal mined and prepared for market at this point is of great purity and hardness and to show its character souvenir paper weights made of the coal were presented to the members. After the inspection of the breaker there was a short informal meeting at which a few remarks were made by Mr. Philipp von Haag, President, and Director at the Ministry of the Interior of the Kingdom of Wurtemberg.

He said that America in his estimation has always stood at the head of the civilized world in industrial aggressiveness, but, as the old proverb says "trees do not grow into the clouds", and he finds America backward in one thing, the utilization of its waterways for forwarding and transportation purposes.

The train left Coaldale at 5.15 P. M. and returned to Philadelphia via Tamaqua, Reading and the Schuylkill Valley; the return route was far to the westward of the route taken on the outward trip and gave an opportunity to see other interesting portions of the coal fields, the busy valley of the Schuylkill River and the old and now unused Schuylkill Canal. Philadelphia was reached at 7.45 P. M., refreshments having been served on the train.

Two booklets were furnished each member of the party, one describing the route followed and the history of many of the establishments visited or passed, with considerable statistical information, and the other contained an interesting statement of the history of the Lehigh Coal and Navigation Co. and its present status; the former of these was furnished by the Local Organizing Commission and the latter by the Lehigh Coal and Navigation Co.

While this is classed as a local excursion and occupied one day, it may be interesting to add that the distance traversed by the train was about 210 miles. The train arrangements were in charge of Mr. Edwin L. Lewis, representing the Reading Railway Co., whose work is deserving of much credit.

Excursion to Trenton, New Jersey and the upper Delaware River.

This excursion, in charge of Mr. Herbert F. Stetser, Chairman of the corresponding sub-committee, left Broad Street Station, Philadelphia, in a special train of the Pennsylvania Railroad Co. at 9.02 A. M. and arrived at Trenton at 9.53 A. M., the members of the party numbering about 250. The party was met on arrival by a large local reception committee, of which the Mayor, Hon. Frederick W. Donnelly, was Honorary Chairman and General Wilbur F. Sadler, Adjutant General of the State of New Jersey, was Chairman, and were taken in automobiles on a tour of the city, being shown some of the leading industrial establishments and Cadwallader Park. The tour ended for the time at the State Capitol—a handsome building overlooking the Delaware River. The party was escorted to the assembly room, where Mayor Donnelly presented greetings on behalf of the city. He was followed by His Excellency, Woodrow Wilson, Governor of New Jersey.

Governor Wilson said that the mere fact of such a great Congress coming together would serve to strengthen the links of friendship between the great nations of the world. He declared that the great need of this country was the building up of an adequate system of waterways to supplement the existing railway facilities, and deplored the short sighted policy pursued by their government the result of which has been to drive the American flag from the seas; and advocated a progressive policy that would result in their country building up a merchant marine of its own. Referring to the Panama Canal he said he thought that the United States was the most unselfish country in the world, because after practically abolishing its own merchant marine, it was now engaged in building this great canal for the benefit mainly of other nations.

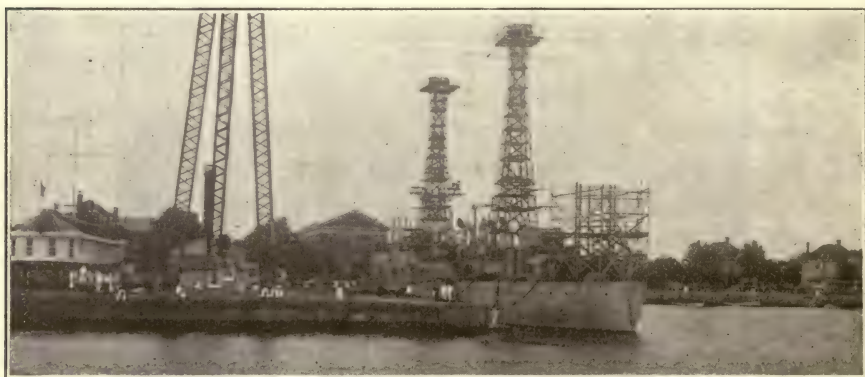


New Jersey State Capitol, Trenton.

Mr. Jean de Pulligny, of France, was then asked by Barón von Coels von der Brügghen, Under Secretary of State and First Ger-

man Delegate, and by Counsellor of State Chargueraud, First French Delegate, to answer in the name of all foreign members.

After thanking His Excellency, Governor Wilson, for the kind reception extended to the Congress by the people and the Governor of New Jersey, Mr. de Pulligny expressed the admiration and sympathy of all foreign delegates towards the American people for their beautiful country and their admirable development in all the paths of civilization; these feelings being heartily shared by all the foreign countries to which the delegates belonged.



United States Navy Yard, Philadelphia.

From the State Capitol the party proceeded to the harbor front, the proposed improvement of which was explained to them. Dredgers were here seen at work on the project for securing a channel depth of 12 feet at mean low water from Philadelphia to Trenton. The party then boarded the steamboat "Sylvan Dell" and proceeded down the Delaware River. They were accompanied by Mr. Charles R. Hancock, Vice-President, and Mr. C. Arthur Metzgar, Secretary of the Trenton Chamber of Commerce, and Col. Mahlon R. Margerum. The first stop was at Cramp's Shipyard, in the northern part of Philadelphia. Here several ships under construction were inspected, including the Dreadnaught "Wyoming" then nearly ready for launching. Returning to the steamer they then proceeded to the plant of the New York Shipbuilding Co., Camden, N. J., which plant was also quite thoroughly inspected. Here were seen some large battleships under construction for the

Argentine Republic and Japan, as well as the Battleship "Arkansas", a sister ship of the "Wyoming", constructed for the United States Government.

The next point visited was the United States Navy Yard at League Island. On landing they were received by the Commandant, Captain A. W. Grant, and by the other officers stationed at the Yard, under whose guidance they visited the many interesting features of this important station. From League Island they were taken to Washington Park, New Jersey, where a "planked shad dinner" of the kind for which the Delaware River is famous, was served. A heavy thunder shower, which began and ended during the dinner, did not seriously interfere with their enjoyment. After the dinner the party was brought back by the "Sylvan Dell" to Philadelphia.

"Smoker" and entertainment at Bellevue-Stratford Hotel.

This entertainment, in the Ball Room of the Bellevue-Stratford Hotel, which was elaborately decorated, took place on May 25th, at 8.30 P. M. It was arranged by the Local Organizing Commission for the members of the Congress and their ladies, and was attended by many. The program included a number of amusing and interesting vaudeville features which were much enjoyed. After the close of the performance, buffet refreshments were served in the Clover Room of the Hotel, followed by dancing in the Ball Room.

Excursion to Cape May, New Jersey.

This excursion on May 26th, was in charge of Mr. George T. Williams and was participated in by about 340 members. The party left the foot of Market Street, Philadelphia, at 9 A. M. and, after crossing the Delaware River by ferry, boarded a special train of the Pennsylvania Railroad Co., which arrived at Cape May, about 11.15 A. M. The party was accompanied by Brigadier General Wm. H. Bixby, General President of the Congress, and Hon. J. Hampton Moore, President of the Local Organizing Commission. On arrival they were taken by street cars to the Club House of the Cape May Yacht Club, where a luncheon was offered. After luncheon a large number of launches belonging to the

members of the Club conveyed them on an inspection of the new harbor under construction. Here, by the building of two jetties at the entrance and by a large amount of hydraulic dredging inside the entrance, a deep and commodious harbor is being constructed and at the same time the material dredged is being used to reclaim the extensive marshes lying between the harbor and the pre-



National Harbor of Refuge, mouth of Delaware Bay.

sent built-up portion of the town. Upon landing from the launches special street cars transferred the party to Cape May Point (which lies on the other side of the town), at which point they were to embark on the steamer "Queen Anne". Here His Honor, **James J. Doak**, Mayor of Cape May, addressed the members, saying :

that the people of Cape May felt highly honored by having such a representative body of people from all parts of the world to visit their city, and, as head of the city government, he extended a hearty welcome and greeting. He hoped that what they had seen during their short stay had pleased and interested them and that they would again visit the city.

Hon. **J. Hampton Moore**, M. C., called attention to the widespread influence of the distinguished foreign visitors, and, continuing,

told the Cape May people that they were honored by such a representation of the nations as they had not seen before and probably would not see again for many years.



Delaware breakwater, Cape Henlopen. — National harbor of refuge.

Mr. **de Timonoff**, then spoke as follows (in English) :

Mr. Mayor of the City of Cape May, Ladies and Gentlemen,

The members of the XIIth International Congress of Navigation are exceedingly pleased with their visit to Cape May. They have found here a very interesting combination of a beautiful watering place, perhaps the most beautiful along the New Jersey coast, with a sea port which is being rapidly built now under the prognostics of an important development.

The situation of this port near to the entrance of the mouth of the Delaware river and at the doors of Philadelphia is undoubtedly fit to ensure for the city of Cape May a happy future. Cape May stands thus on the threshold of a new era. It is not only to be known again as one of America's most attractive sea side resorts and to see again the days when large cities of the East sent here their best families for the summer holidays, but is to have its own commercial harbor and to become a partner in the commerce of the world.

On behalf of the Permanent International Association of Navigation Congresses, I congratulate the citizens of Cape May for the efforts they have made to attain this position and wish them all success they deserve. At the same time, I thank them for the reception they have given us today and especially the President and Members of the Cape May Yacht Club for the hospitality they offered to us in their Club house and for the most interesting trip in their launches over the construction works of the new Cape May harbor; I heartily thank also His Honor James J. Dock, Mayor of Cape May for his kind words of welcome and greeting.

Several other foreign members spoke, amongst others Mr. Chargueraud for France and Mr. de Thierry for Germany.

After these speeches the party was then taken to their steamer, lying at anchor off the Point, in yawls belonging to the United States Life Saving Service. These boats were in charge of Captain John S. Cole, Superintendent of the New Jersey Coast Life Saving Stations, and were manned by the crews taken from the Two Mile Beach, Cold Spring and Cape May Point Life Saving Stations. On reaching the boat, luncheon was served; the boat proceeding meanwhile to the National Harbor of Refuge, completed in 1904, as a refuge harbor for vessels navigating along this portion of the Atlantic Coast. The harbor consists of a very long granite rip-rap breakwater with superstructure carefully laid, facing the direction of the heavy storms and, in connection with the curved Delaware shore line, shelters a large deep water area.

At the inner end of the breakwater and on a line at right angles to it, a series of detached piers, of construction similar to that of the breakwater, extends to the Delaware shore in order to prevent fields of ice moving down the Delaware from entering the harbor area. The so-called "Delaware breakwater", constructed many years ago, much nearer to the Delaware shore, to form



U. S. Government dredge « Delaware » working in Delaware River.

a harbor of refuge for the smaller coasting vessels of the time, was also seen. As the steamer proceeded to Philadelphia it passed through the entire length (about 45 miles) of the broad estuary known as Delaware Bay, which at its widest point has a width of about 20 miles; thence up the Delaware River for a length of about 55 miles. The river for much of this distance has a width of about 2 to 3 miles. Opportunity was thus afforded of seeing the fine natural water approach to Philadelphia from the sea, while at the same time the important channel improvements being made by the Government were explained at the various localities passed. The party reached Philadelphia about 10.30 P. M., dinner having been served on board.

Excursion to Atlantic City, New Jersey.

The party, numbering 341, in charge of Mr. Miers Busch, left the Chestnut Street Wharf, Philadelphia, at 9 A. M., and boarded at Camden, N. J. (opposite Philadelphia) a special train of the Philadelphia and Reading Railway Co. This train consisted of seven steel coaches, and made the run from Camden to Atlantic City, a distance of 55 1/2 miles, in 43 minutes. At Atlantic City the party was taken by special street cars to the new Steel Pier, built for amusement purposes, where a concert with specially arranged program was given them from 10.30 A. M. to 12 noon, the national airs of many nations being included in the program. From the pier the party proceeded by the Boardwalk along the beach to the Hotel "Marlborough-Blenheim", the largest building in the place constructed of reinforced concrete where luncheon was served. In the afternoon a trip was taken in rolling chairs, over the central portion of the Boardwalk, covering a considerable distance.

The party met again in the evening at a banquet at the Marlborough Blenheim Hotel. Music was furnished by the hotel orchestra and the evening was a great success.

After dinner during dessert Baron **von Coels von der Brügghen** was the first to rise and thank the organizers of this entertainment which had succeeded so admirably. He expressed himself as follows (in German) :

Ladies and Gentlemen,

After devoting several days to the work of the Congress, the active Organizing Committee has invited us to-day to an excursion which has enabled us to spend a few delightful hours at sea. I think I am voicing your views in expressing our most grateful and cordial thanks to the Committee on this occasion. After the hot days spent in Philadelphia, and the somewhat fatiguing excursions of last week, our stay at the seaside in bracing and agreeable atmosphere has been most refreshing to us, and will enable us to carry out our work next week with renewed vigour. And the time thus spent will also have had a most educational effect upon us. We shall have been privileged to see a seaside watering place which for size and beauty is unrivalled throughout the world.



BANQUET OFFERED TO THE MEMBERS OF THE XIIth CONGRESS BY THE LOCAL ORGANIZING COMMISSION, ON MAY 27, 1912

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(Continuing in English :)

I am sure that all members present will agree with me in saying that the whole management of our excursion was excellent. If I should criticise anything I might express my regrets that the Congress did not come in touch with its real element, the water. I think that a general bath in the waves of the Atlantic Ocean would have been a fitting climax for this excursion of navigation people. In any case the remembrance of this most agreeable and delightful day will stand for ever in the mind of the Congress. (*Prolonged applause.*)

Mr. **Henri Crahay de Franchimont** then rose and expressed his satisfaction as follows, (in French) :

Ladies and Gentlemen,

At the close of this agreeable day allow me, on behalf of the French speaking members of the Congress, to thank the members of the Organizing Committee of Philadelphia for the fine excursions they have arranged for us with such care, forethought and taste. We know American hospitality of old; you, gentlemen of the Committee, have just given us another sample of it by receiving us on this magnificent beach where the amusements of the most celebrated watering places have been organized on a gigantic scale in a few brief years.

Be assured, Gentlemen, that we credit you with all the charming impressions we shall take away with us from Atlantic City, which will remain engraven in our minds. (*Loud applause.*)

Mr. **Ignazio Inglese**, then spoke as follows (in English) :

Ladies and Gentlemen,

We Italians have seen to-day one of the most beautiful places in the world. Coming here from Italy, we have found a piece of our own sky, of our own sea.

But we have found something more; we have found true heartfelt American hospitality; we do not feel here as if we were in a foreign country, for which we give our best thanks to the Organizing Committee. We are all united in that brotherly love of which we heard and felt in Philadelphia. I feel really proud in this moment to belong to that nation from which came the man who first set his foot on this country, which has so quickly developed its astonishing natural resources, with the energy of its men, with the wonderful organization of its industries. (*Loud applause.*)

Grand banquet of the Congress.

This took place on 27th May in the Ball Room of the Bellevue-Stratford Hotel which was brilliantly decorated for the occasion. All members and delegates, except the ladies, and many of the members of the Organizing Commissions attended this banquet. Covers had been placed for 500 guests and nearly that number was present.

In the latter part of the evening many of the ladies came in and occupied boxes overlooking the room. Mr. William T. Tilden, President of the Union League Club and Chairman of the Entertainment Committee, then rose to introduce the toastmaster whose functions during the evening were to call upon the various speakers.

Mr. William T. Tilden (in English) :

On behalf of my colleague, Mr. Kendrick, who arranged this programme and this portion of the Convention, I have the privilege of introducing the Toastmaster. If anybody has a notion that the Toastmaster of this evening needs any introduction in any country of the world, they are very much mistaken. (*Applause.*) He is a trinity in languages as you all know, and possibly more. He is a unity in heart for all the people in the world. (*Applause.*) Above and beyond that, he is a man who has been elected Mayor of the city of Philadelphia, the City of Brotherly Love, and the City of Sisterly Kindness (*applause*); the City that I think believes in men doing men's work, and women doing their work. But seriously the man whom we all love and whom no one has failed to love who has ever had the privilege of knowing him; I know of no one and the Committee of Entertainment knows of no one, who can reach around the circle as completely among the nations of the world as the Mayor of the City of Philadelphia, whom I will present to you as Toastmaster, Hon. Rudolph Blankenburg.

Hon. Rudolph Blankenburg, mayor of Philadelphia (in English) :

Ladies and Gentlemen,

I hardly know how to be affected by the introductory remarks of my friend, Mr. Tilden. At one time I felt like crying and at another time I felt like laughing, but on the whole, I think I am fairly well satisfied.

Mr. Tilden has known me for a great many years. We have not always agreed; sometimes he has been wrong (*Laughter*); but, seriously, ladies and gentlemen, it affords me more than a great deal of pleasure to act as Toastmaster on this auspicious occasion.

Never in the history of this country,—and it is not quite as old as Egypt, or Italy, or France, or England, or Germany, but never in its history of one hundred years, or a little more—has there been as distinguished an assembly of notable people from all over the universe assembled in any city of the United States as there is assembled here this evening in the City of Philadelphia. (*Applause.*)

It means so much, not for us in the United States alone not so much for European countries either, but it means so much for the whole world, that representatives of forty-seven nations should be assembled in the City of Brotherly Love for the purpose that has called you together in Philadelphia. (*Applause.*)

I have already extended to you a welcome at the Metropolitan Opera House, on Thursday last. It was a sight then to see the many distinguished men from all over the world all with the same purpose; all animated by the same spirit for the brotherhood of man, and the welfare of the whole world at large.

It is more than a distinguished honor to stand before you tonight as Chief Magistrate of the City of Brotherly Love. It is an epoch in the history of our Country and I hope it will be an epoch in the history of the world at large. We have all assembled, not for any mercenary purpose, but we have all assembled animated by the single purpose of doing good for mankind at large. (*Applause.*) Thus, my friends, and I want to call you my friends, you are welcome to the City of Brotherly Love and I extend to you an earnest and sincere welcome.

If I could only speak all the languages that are spoken by the men gathered around this festive board, I would say a few words in all the languages, but let me say in my native tongue "Welcome my friends, welcome, and I hope you will see us again." (*Applause.*) (This sentence was spoken in German and then translated into English by the speaker.)

Now, ladies and gentlemen, as Toastmaster of the evening it becomes my pleasure and duty to introduce the different speakers. They have all been warned that they must not speak more than two hours each (*laughter*), and I hope they will adapt themselves to this warning, because if they don't, they might miss the steamer when they want to go home.

The first speaker of the evening is a distinguished gentleman from Russia who has kindly consented not to address you in the Russian language. He is a master of all languages. He speaks them well but he will speak for himself.

I have great pleasure and honor of introducing to you Professor de Timonoff of St. Petersburg.

Prof. **de Timonoff** (in English) :

Mr. Chairman, Ladies and Gentlemen,

Allow me to thank all our American friends for the great kindness they have shown to the Permanent International Association of Navigation Congresses, which I represent, by the cordiality of their reception of the members of this body in this country and more especially at this dinner.

I am proud of it on behalf of the International Association, because it happens that, under the guise of this dinner, a charming and delightful scene of luxurious hospitality, a special atmosphere has been created of high international interest and public anxiety. This, it seems to me, gives a dignity and, in the best sense of the word, a nobility, to this assemblage of representatives of so many countries,—that they cannot come together even for convivial and festive purposes without having the key-note of a very high public interest running through all that they think and say. This key-note has, perhaps, a somewhat professional sound, but is it not natural in a gathering of men where the engineering profession is so eminently represented ?

On the other hand, we cannot boast of being greatly superior to the ancients in literature and art, or in philosophy, but as far as engineering problems are concerned, we have enormously advanced, thanks to the practical applications of scientific theories. Comparing generally the conditions of life now and then, we may sum up the difference by claiming that our progress is due principally to the improvement of the means of communication and to the saving of manual labour by the introduction of mechanical power.

Therefore, we are highly indebted to our American friends for extending to us this magnificent hospitality and giving us under the charming form of a splendid dinner the possibility to concentrate once more our forces for the general benefit of humanity.

I conclude in wishing the greatest success in life to all members of the Organizing Commissions and their Committees who have taken part in the preparation of the XIIth International Congress of Navigation. (*Loud applause.*)

Mayor **Blankenburg** (in English) :

I am sure, my friends, that we have all enjoyed the remarks of the distinguished gentleman from Russia. The tie of friendship between Russia and the United States dates back for many, many years, and I hope it will never be interrupted. (*Applause.*)

After having heard from the far away Empire of Russia, it is but fitting that now we should hear from our own beloved country and I will call upon Brigadier General William H. Bixby, Chief of Engineers, United States Army, to speak for America, the home of the free.

General **Wm. H. Bixby** (General Bixby delivered one paragraph at a time, English, and then in French, throughout his speech. The English version is as follows :)

I take pleasure in saying a few words tonight especially to the people of Philadelphia, who have rendered so pleasant as well as so profitable, the visit of this International Association to the United States.

Mr de Timonoff has spoken to you for the Association, which he represents as a whole. I speak only for the Congress itself, being President only so far as concerns the meeting this year in Philadelphia.

International Congresses are somewhat new things for the United States. Heretofore, we have been so busy with our own daily work, which continually presses upon us, that we have not had much time to consider such work from the point of view of the entire world, that is to say, from the point of view of the day when the whole world will be a single nation, with common views, all its action being directed to the best interests of, not the United States by itself, but of the World as a whole. The more we study and examine into such matters, the better we understand that the best work of any single nation is that which brings about the best results to the world at large. These International Congresses, whether of waterways or roads or of questions of political economy or of warfare, as opposed to peace, are all of great value in reconciling the divergent interests of all countries and in determining the best routes to be followed in whatever progress is undertaken.

I am sure that the American public here present now realizes better than over before, that twenty or more countries here represented, are being led by men of great mental force, who quietly but surely, will in the end bring about a uniformity of action throughout the world, which will revolutionize it most effectively without need of any revolution, a result much to be desired. We must in the United States be progressive, as are other countries, but we must progress by sane methods, following routes legal as well as rational, by which only can we secure the best results at the least cost and with least derangement of the world's business. (*Applause.*)

You of Philadelphia, have been very hospitable to our Association, and without energetic and hearty assistance, we of the American section could not have entertained our foreign visitors so properly and so agreeably. While this is true as regards the work of the mens' committee, it is far more true of the work of the Ladies' Committee. You may all rest assured that your visitors will carry away with them a delightful and enduring recollection of their meetings here. In the name of the American section of the Association, I desire to thank you all, once more, both ladies and gentlemen, for your hearty assistance in this International Congress. (*Loud applause.*)

Mayor **Blankenburg** (in English) :

I am rather impressed at this moment. We have heard speeches in English and in French. I think there is another nation that should be heard from, and it gives me a great deal of pleasure to call on a gentleman now. (In German) "He will speak in our dear mother-language."

Now, if you didn't all understand this, it is not my fault; it is yours, and I hope the time will come when all the great languages of business, of diplomacy, of art and of science will be spoken by all the peoples of all the world. (*Applause.*)

I will now introduce to you, Baron von Coels von der Brügghe.

Baron **von Coels von der Brugghen** (in German) :

Mr. President, Ladies and Gentlemen,

We came to the first Congress of Navigation held on this side of the Atlantic with the greatest expectations, not only because of the important questions on its agenda, but also because we hope to see in this country, so well endowed by nature, which is progressing with giant strides, things conceived on a large scale, and also hear new things.

The time has long gone past when the new continent came to Europe to learn things, and to-day we base many of our undertakings on the inventions and organizations of the new world.

The first organization we have been privileged to witness with all its installations is that of the State of Pennsylvania. A series of interesting excursions has enabled us to admire the natural beauty of the country, and to acquaint ourselves with its highly developed industries in its great cities. Its gigantic iron and steel works, its important coal mines, its great shipyards, are eloquent proofs of its immense natural resources, and of the capacity of its population. The interest we have in seeing all these installations has been heightened by the amiability and cordiality of the welcome we have received everywhere. Friendly sentiments were so eloquently uttered by Mr. Bell on behalf of the Governor of the State at the opening. Similar sentiments were expressed during the meeting with warmth by Mr. Blankenburg, Mayor of Philadelphia, who particularly addressed his welcome to us Germans, and assured us that the several million Germans who have adopted American nationality have not forgotten their fatherland on the other side of the ocean. These friendly feelings have been manifested to us everywhere in our welcome.

(Continuing in English :)

Mr. Chairman, and ladies, and gentlemen, When we shall have returned to our countries we shall forever remember the kind hospitality of the State of Pennsylvania, and of its largest city in which our mission has

been accomplished. We shall form always most hearty wishes for the welfare of this State and for all of its inhabitants and for the excellent men who are at the head of its government. May the men of the State of Pennsylvania, who have acted in the past an important part in the history of the United States, maintain and increase their power and their interest. (*Applause.*)

Mayor **Blankenburg** (in English) :

I am sure you all agree with me that the address delivered by the distinguished speaker finds a hearty echo with all of us. Pennsylvania at one time in the history of our country decided to use the English language instead of the German language. It was only by a small majority that this was done. We all remember Emil Pastorius who came here shortly after William Penn crossed, with the Germans who landed here, who in his early distinctly said. "I abhor slavery and slavery must be abolished." It was a German who first gave utterance to those words and I honor the memory of Emil Pastorius for so doing, and now to speak for the State of Pennsylvania, the Keystone State of the Union it would be proper to call, in the first place, upon the Governor of the Commonwealth. Unfortunately he is prevented from being with us tonight, owing to sickness, but we have here with us his representative who will speak in the name of the State of Pennsylvania to welcome you and to give you words of good cheer—the Hon. John C. Bell, Attorney General of the State of Pennsylvania.

Hon. **John C. Bell** (in English) :

Mr. Toastmaster, guests and ladies and gentlemen,

Mayor Blankenburg's felicitous introductions always bespeak a cordial greeting, for which, on behalf of the State of Pennsylvania, I thank you and him.

Looking over this assemblage and taking my cue for a moment from the remarks of Baron Von Coels, I am reminded that the world's laws and customs change; empires rise and fall; nations pass away; even languages become dead, but there is one custom, old as the everlasting hills, that never changes. It is mankind's custom of manifesting good will, good fellowship, the hospitality to which the representative from Germany referred, by a dinner—a royal dinner like that of which we have partaken this evening. (*Applause.*) Reason and a dinner like this can never go hand in hand together, and, if we delve still farther into antiquity and scan the records, we find the example of Lyncurgus, who observed the custom of a public dinner where men of state, and experts, possibly, in inland waters and maritime navigation, met and discussed affairs of

nations. This occurred nine hundred years before Augustus Caesar, who lived at the culminating point of the history of the world, nineteen hundred years before our time and two hundred years before Romulus and Remus were suckled on the banks of the Tiber by the mother wolf. We have had precedents perhaps and prototypes for this royal dinner which bespeaks the heartfelt hospitality of the City of Philadelphia, the State of Pennsylvania and the United States of America to you royal delegates gathered from all parts of the world. (*Applause.*)

Truly "one little touch of nature makes the whole world kin."

The toast that you suggested, "the Commonwealth of Pennsylvania," on this occasion at which delegates have gathered from foreign shores, calls to mind a memorable, not to say an epochal year, in the history of America and the world. It was the year in which a certain King was universally proclaimed the Grand Monarch in the country in which this King was universally recognized as omnipotent. It was the supreme triumph of autocracy, war, and of vast armies and great generals, intriguing ministers and the policy wherein the King was the state. The year was the very apogee of his reign and the very zenith of his power, his glory, his regal magnificence and extravagance. Of course, I need not say to you that that king was Louis XIV. The year was 1682. The American antithesis, if you please, and note the gestation of time, that very same year William Penn sailed up the Delaware and sowed the seeds of a new government upon these inhospitable shores. His government was called "the holy experiment." His followers were Quakers or Friends, who were opposed to war. He was the champion of civil liberty, the apostle of peace and of brotherly love. In the preface to his constitution, referring to the three kinds of government, monarchy, aristocracy and democracy, and the relative merits of each, as claimed by their several admirers, he said: "I choose to dispose of this controversy by the simple distinction applicable to all, that government is free, whatever may be its form, where the laws rule and the people are a party to those laws." And I speak in praise, not in disparagement, of your several governments when I say that in the forward movement of the world year by year we see a greater recognition of Penn's principle that "the laws should rule and the people should be a party to those laws." But Penn himself, a full century in advance of the world, chose to give to the free men of his province a novel, democratic form of government which to use his own words, "put the power of government into the hands of the people."

Around the dome of the beautiful capitol at Harrisburg that you will see on Thursday next, are these citations from his writings at the time, "And my God will make it the seed of a nation for which nation we need a precedent." And well we know that the gift of our civic forefather did make it "the seed of a nation", for in God's providence it was destined that Penn's city of Brotherly Love should become the cradle of civil liberty in America, that, in that historical hall, down on Independence Square, that you visited on the first day of your stay here, there should be framed

the Declaration of Independence that "all men are created equal and are endowed by their Creator with certain inalienable rights", that your life and liberty and prosperity and happiness may be preserved, and, to preserve those rights, governments are established among men "that derive their just powers from the governed"—a principle, the recognition of which revolutionized the policy of the oldest governments in the world. In that same historic hall a dozen years later there was framed the constitution of the United States, the most perfect instrument says your great com-moner, Gladstone, ever struck off at a given time by the brain and purpose of man. (*Applause.*)

And what happened during that century to the Bourbon monarchy ? Alas, you know it was wasted by war, disintegrated, and died in the French Revolution, and simultaneously with the era of that death struggle of the Bourbon monarchy, Penn's domain in Pennsylvania became and has been and is today the Keystone in the arch of free government. That government, as President Taft said the other day, at the opening of this Congress, consisted then of but thirteen struggling colonies with less than three million souls, but today, in its continental domain extends from ocean to ocean with a population of upwards of one hundred millions, in behalf of whom the President of these United States extended to you their most cordial greeting and heartfelt welcome. (*Applause.*)

When you sailed up the New York Harbour you observed the beautiful Bartholdi statue, the gift of our sister Republic, of France, that has risen sphinx-like out of the ashes of the Bourbon monarchy, a statue symbolizing "Liberty enlightening the world". Ah, France, la belle France, you dwell in the inner temples of our hearts. (*Applause.*) I would not have you believe that, much as we love France, we love her sister nations, great and small, maritime and inland, a whit the less, if at all, for blood is thicker than water, and the nations whose delegates are here with us their blood courses through the veins and pulsates in the hearts of the American people. (*Applause.*) Thank God for the admixture of the races; it is the salvation of America and may be of the world. I glanced around this room tonight upon your national emblems, beautiful flags with their variegated colors, all so harmoniously interwoven that they seem to blend and shape themselves into a new rainbow of God's promise to mankind; a rainbow of liberty, equality, fraternity and peace. (*Applause.*)

Yes, peace! for the time cometh when Penn's principles of peace and brotherly love shall be recognized by all the nations of the world as the fundamental principles of government. The time cometh when, as the President of the United States said the other day, our war ports and ships will be dismantled and disarmament will be the universal decree of all the nations of the globe. (*Applause.*)

The time cometh, for peace is of Heaven,—the eternal years of God are hers—and it is strictly within the limitations of truth to say that the assembling here in the City of Brotherly Love of this Congress of delegates from the nations of the world, and the work which they have done and

which they recommended, will record a marked advance in the forward movement of the world towards universal peace and the brotherhood of man. A few days ago as this procession of delegates wound around the City Hall en route to the Metropolitan Opera House to receive the welcome of the President of the United States, the Governor of Pennsylvania and Mayor of Philadelphia, I chanced to glance—as many of you may have—at the statue of William Penn that surmounts the tower of City Hall. There it stands in majestic placidity, his right hand extended as it pronounces a perpetual benediction upon the City and all the sojourners therein, and, as I gazed in fervent admiration, in my mind's ear his spirit seemed to say : “Peace be with you, my fondest hopes are being realized.” (*Applause.*)

Mayor **Blankenburg** (in English) :

I wonder, when my friend, Mr. Bell, spoke of the banquet tonight and referred to the days of Lycurgus, whether he remembered that part of the repast was the black soup. We didn't have any black soup tonight. I think we had a modern bill of fare.

You have heard now in different languages and from those who have acquired the language which we call our own and I shall now take great pleasure in presenting to you a gentleman who represents the nation that gave us the Marquis La Fayette, one of the grandest figures in the War of the Revolution, and I now will present to you M. André Charguéraud.

Mr. **Charguéraud** (in French) :

Good roads and waterways!

With these words our President, the Honorable J. Hampton Moore, opened his remarks in the speech he made last November at the first meeting of the American Association of Roads Improvement.

Good roads and waterways!

This is in short what His Excellency William H. Taft, the Honorable President of the United States, wished us on Thursday last.

I cannot express to you all the satisfaction I experience in hearing such good counsel from such important authorities in the United States.

We in France are great admirers of American ingenuity. The bold conceptions of American engineers, their gift of always finding the quickest and most practical solution of the most difficult problems, are examples from which in our opinion we might usefully take a lesson.

Not long ago our engineers in France, who persisted in occupying themselves with great thoroughfares and inland navigation canals, were considered behind the times and incapable of adjusting their views to modern requirements of progress. They were called the engineers of the old

school. Why, we asked them, do you want to keep your system of main national roads? Have the United States got federal roads? Why persist in keeping up canals which are things of the past in the history of modern modes of locomotion? Have not the Americans given up all their artificial canals, and even using their large waterways?

Are you quite blind to the fact that the "iron horse", (Mr. Hampton Moore's own expression), has quite superseded other modes of locomotion?

There is no longer a need for roads, canals or even staircases. The rail in length, breadth and height, the rail has surpassed everything everywhere, and the French Chamber of Deputies has voted a law removing the national roads from their classification, and limited its grants to navigation, whilst France itself has treated its old engineers and their antiquated views with diffidence.

Excuse me Gentlemen if I appear to exaggerate; but what a revenge is yours at this moment!

Last Tuesday I had the great honor, with a few of my colleagues of the French delegation, to be received by the Agricultural Committee of the House of Representatives, and by the Agricultural Committee of the Senate.

The honorable members of the Congress welcomed us in a manner which has touched us extremely, and I wish to thank them here in public for their reception. (*Applause.*)

This evening at the banquet which has been so graciously given by the Association for Road Improvements we have acquired the conviction that the road system is one of the main preoccupations of your country.

It is now the same for waterways, and I cannot tell you with what sympathetic curiosity we have followed the trend of your ideas on this subject. The Commission of inland navigation was formed in 1907, and it recommended that an organisation should be constituted to control the administration of navigable waterways under a sole management responsible to Congress, which management would be entrusted with the preparation of a general plan drawn up with method and consistency.

The meeting of the present Congress at Philadelphia has seen the consecration of this fine conception, and we have approved unanimously the initiative of the Government of the United States, which has convened one of our periodical meetings for the first time on American soil. (*Applause.*)

Teach us to build good roads was the indulgent remark of our President a few days ago; teach us to carry out great works of navigation is what I should like to say myself to our American colleagues.

Gentlemen, you have been the first to understand that mutual interchange of views experts is the best way to achieve progress, and you have never hesitated to send your most distinguished engineers abroad to study the methods adopted in other countries.

I am proud and happy to salute General Bixby here, the chief of American engineers who, as a former pupil of the Ecole des Ponts et Chaussées of France, has left behind him the most agreeable souvenirs.

The Government of the French Republic has in this order of ideas decided to appoint a mission of engineers to the United States, and Parliament has voted the necessary funds for that.

The chief of this mission who resides at New York, is Mr. de Pulligny, whose eulogy I may not make here as he is my compatriot, my colleague, and my friend. M. de Pulligny will endeavour to maintain, between our engineers and yours, that cordiality and open friendship which is so well exemplified by our meeting this evening. (*Applause.*)

In conclusion, Gentlemen, permit me to thank the local Organizing Commission warmly, and particularly its President, Mr. Hampton Moore, its Vice-President Mr. Tilden, and its Secretary Mr. Sproule, and also its members for the charming evening we have just spent with them. (*Applause.*)

But, Gentlemen, I should be lacking in one of the good French traditions if I were to forget to address, on behalf of the French ladies who have attended this Congress, my warmest thanks for the delicate attentions with which they have been surrounded by the ladies of Philadelphia during their stay in this beautiful city. (*Loud applause.*)

Mayor **Blankenburg** (in English) :

It is with the greatest pleasure that I repeat the remarks made by the distinguished gentleman who has just addressed you and who is, perhaps, the greatest engineer of roads in the world. He paid his compliments to the ladies of Philadelphia, who have done everything in their power to make the sojourn of the ladies coming from all parts of the world, a pleasant one in the City of Brotherly Love. (*Applause.*)

But what would our great United States be today, or what could they have been if it had not been for the schools of our country? It has free schools and universities in every community, in every town, in every city, in every village that have educated the American children to become the citizens of this great Republic. The public schools are the very foundation of our prosperity and of our greatness and they will insure the future of our country. As one of the men who has done his full share, aye, more than his full share, to bring the public schools of this city, of this State and of the whole nation, to the perfection which they enjoy today, I take great pleasure in presenting to you the Superintendent of the Public Schools of Philadelphia, Mr. Martin G. Brumbaugh.

Mr. Martin G. Brumbaugh :

La Presidenta, señoritas and senors (1).

I have very great pleasure in speaking to you for a moment this evening, representing, as our distinguished Mayor has said, one of the

(1) Mr. Brumbaugh opened his address with several phrases in Spanish).

quiet, modest and inconspicuous forces that make all the great leaders of this Republic and all the great leaders of all the nations of the world—the school-master. (*Applause.*)

If there is one institution of society that has pursued through the centuries and carried its forces to the fore and its services to all the nations of the world, it is that institution which in the ancient days was called the schola and after that known through the world as the eschoöla and in America is upheld by the endearing term, the free American public school. (*Applause.*) You may have wondered since you came to this City of Philadelphia why it is that we should have such a reign of peace and order and of law in a community made up of all the peoples of the world? It is because we take the children of all of our people into our free public schools and mould them there for citizenship in this mighty Republics of ours. (*Applause.*) Wherever you go in America, city or village or country roadside, you will see everywhere this institution of our American life, the public school.

Back of every man who is here tonight, representing all the larger and dominant views of progressive civilization somewhere along the line of your life, next to your mother, stands the quiet godly guidance of a fine school teacher man or woman. (*Applause.*)

We have no fear, as our distinguished Attorney General has indicated to you, of the army of people who come to us from all the nations of the world, because we put upon them in their early years the touch and the impress of our American spirit in our American public schools. We have them here, there and everywhere. We are sending letters to them and they are sending letters to us, each thanking us for what he has been able to accomplish. He is doing our deeds, accomplishing our works, adding glory and honor and prestige to our civilization. It is well known, I take it, to all of you that, in this American Republic, the humble newsboy who sold his wares at one time upon the American railway trains, has become the greatest inventor of our own country, if not of all countries. I refer to that brilliant inventor, Thomas A. Edison. (*Applause.*)

Here in our public schools we care not how humble is the birth or how remote the nativity, or how impoverished is the type that comes into the school, when he comes into the school, as he receives there an equal and full opportunity, and if he possesses endowments he leaves the school and later on possibly as a leading man becomes an exemplar of the democracy of our government and a type of citizen for whom we are all profoundly grateful. (*Applause.*)

While you have been discussing these great and specialized themes, the scientific treatment of our waterways of the world, I ask of you in the name of our school teachers the world over to remember that whatever there is of progress in the scientific world, in the artistic world, whatever there is of progress in the governments of the people, is due to the quiet, steadfast, unselfish work of the school teacher somewhere in some country.

If this Republic has a need that is larger than another to give to its

communities help to study out in times of stress and to get it in right lines of development, it is to increase the efficiency and the quality of the men and women who will in the future train the childhood of the Republic. What we want is more teachers and better teachers everywhere in America. If in the original analysis of our active American population— and this is shown by our recent census to be a fact— we provide in the natural order of things substantially one teacher out of every forty people born in this Republic, it looks as if the good Lord intended that every forty children should have a school teacher, wherever they live in this world. Now, I wish to say to you delegates of many countries that wherever we can give to the population of the world a trained man by discipline in childhood you will aid the government in educating that child and by fitting it to live right in this world. Mr. Chairman, I was admonished not to speak above two hours and I shall obey the law. There is a saying that in one of the remotest counties of Switzerland any guest that is about to depart from that community indicates by the method of saying goodbye how he has been received and treated while in that county or canton. If he has been received very coldly he shakes hands goodbye with one finger. If he has been received with cordial civility, and only that, he shakes hands goodbye with two fingers. If he has been received kindly he shakes hand goodbye with his right hand. If his reception has been exceedingly cordial he shakes goodbye with two hands, and if his reception has been warm and to the heart he says goodbye with a kiss. (*Applause.*) Mr. Mayor, allow me for a minute to speak as one of the delegates to this Congress and to express, therefore, the feeling that as we leave your City we shall say goodbye to you, sir, not with one finger, nor with two fingers, nor with one hand or with two hands, but if you insist upon it, sir, we will confer upon you the fifth degree, reserving, of course, Mr. Mayor, because of your modesty, the ladies for myself. (*Laughter and applause.*)

Mayor **Blankenburg** (in English) :

The modesty of Dr. Brumbaugh is only excelled by his eloquence. I really will permit him to kiss all the men in this room and what I will do will be reported in the papers tomorrow. It is remarkable to notice the linguistic abilities that have been developed through the present Congress. I didn't know that Dr. Brumbaugh was an expert in French and Italian and Spanish and Turkish and Russian, and I don't know but what, if this Congress should last a few days longer I might entertain the fear that we would only be able to talk in Volapuk. (*Laughter.*) Where would we be today, ladies and gentlemen, had it not been for the fact that a gentleman came from an ancient and noble country, which is represented by one of the delegates here tonight, who discovered America in 1492. We would still be living in the forests of Germany, in the dark corners

of Hungary, in the unexplored regions of Russia, had it not been for Christopher Columbus.

We have a representative of that great nation with us who will speak to us in real Italian and not in Brumbaugh Italian. I have great pleasure in presenting to you Mr. Sanjust di Teulada.

Mr. **Sanjust di Teulada** made an eloquent speech in Italian and thanked the city and State of Pennsylvania for their cordial welcome to his countrymen.

Mayor **Blankenburg** (in English) :

It almost seems as if old times had come back. You will remember with me of reading in history how the proud words of a Roman were : "I am a Roman citizen." We are tonight proud to have with us a gentlemen representing that ancient country and that ancient city who has so eloquently just spoken to us in his native language.

Come now from one of the oldest civilizations of the world to one of the latest but not the least, as anybody in this vast audience who has ever visited the Japanese Empire well knows.

In 1858 the Japanese Empire was a dark page in the history of the world. Today Japan stands with the rest of the great powers of the world as one of the civilized nations that ask for your applause and that deserve your applause and that will continue to stand foremost among the nations of the world. I have been in Japan on three different occasions. There is no country in the world that is, to me, more interesting and there is no country in the world that has, in a few years, made greater progress than was made within forty years nor is there any country in the world that was made a world power in forty years. Japan is a great country, and I take pleasure in presenting to you Captain Matsumura.

M. **Jun-Itchi Matsumura** (in English) :

Mr. Toastmaster, Your Excellencies, Ladies and Gentlemen,

The President of the Second Section of this International Congress of Navigation has asked me to make a speech to you in the Japanese language. It would be much easier for me to express my feeling in my native tongue, but, even at the risk of failing to express all that I feel, I shall speak to you in English, because we are on American soil, the land of our first teachers, the land that opened our country to western civilization over sixty years ago, and it is only because of my sincere wish to pay my respects to those teachers in their own language that my modest effort is being made in English, contrary to the kind suggestion of my respected President, Mr. Corthell.

During this session of the International Congress of Navigation it is hardly necessary for me to say how much we were interested in the pro-

blems discussed, how much we were benefited by the valuable reports of the experts and how much we profited by the association with so many distinguished and prominent engineers and other scientific experts of the whole world. Aside from the technical advantages, we feel that an equally great advantage is the better mutual understanding which arises from personal association, and which better mutual understanding is always a firm foundation for the promotion of world-wide peace between and among all nations.

When we go through your great manufacturing establishments and when we see the signs of the growth of the City on all sides, we can see the greater future of the City, which will continue to grow as long as the Delaware flows into the sea, or the Liberty Bell rests in Independence Hall.

Moreover the hospitality which has been shown to us by his Honor, the Mayor, the officials of the city and the citizens of Philadelphia, and especially by the members of the Local Organizing Commission, headed by Hon. J. Hampton Moore, and Mrs. Cornelius Stevenson, the head of the ladies' committee, seemed to have been dictated by the feelings which must have given rise to the name of the "City of Brotherly Love", and I cannot let this opportunity pass without expressing my hearty thanks to you, ladies and gentlemen, for the courtesy and kindness shown us during our short but pleasant stay in this city.

In concluding I heartily congratulate you all upon the success of this session of the International Congress of Navigation now drawing to a close, and beg you to accept the assurance of our delegates that we will ever bear in grateful and pleasant recollection the memory of our visit to this great mother city of the United States of America, the birthplace of liberty, Philadelphia. (*Loud applause.*)

Mayor **Blankenburg** (in English) :

I am really at a loss to introduce to you in proper language, in any language known and unknown, the next speaker of the evening. You all agree with me that there is but one man who can be thus introduced. He is the gentleman who is largely responsible for the entertainment that you and we in Philadelphia have enjoyed since last Wednesday. There is but one man who could thus be introduced and that is the Hon. J. Hampton Moore. (*Applause.*)

The Hon. **J. Hampton Moore** (in English) :

Mr. Toastmaster, ladies and gentlemen,

We are indebted, first of all, to that very distinguished and earnest body of Philadelphia women, headed by Mrs. Cornelius Stevenson, for the success that has thus far attended the entertainment of our guests in

Philadelphia (*Applause*). If the ladies have been pleased with what has taken place, the gentlemen have been more than pleased. We sought to win the ladies first because we knew that to be the first essential to the success of any convention. (*Applause*.)

General Bixby, if we are to believe Mr. Charguéraud, had marvellous success in this direction, during his stay in France and tonight, we observed, he attempted it again when he first directed his address to the galleries. (*Laughter*.)

Mayor Blankenburg, as usual, paid address to the ladies and he does well to speak highly of them; they elected him Mayor of Philadelphia. (*Applause*.)

And Mr. Brumbaugh went so far out of his way as to draw in the Swiss Republic and its ancient osculatory traditions merely to please the fairer sex (*Laughter*). So thus far it has been a ladies night.

Now a word to you who come from foreign climes. We owe to you a debt of obligation. In America, young and vigorous as she is, we refer to the older countries as "the mother countries", Swiss, Italian, French, German, British, Dutch or Scandinavian. — No matter what your nativity, the country from which you come is to us the "mother country", and we allude to it in terms of love and endearment. (*Applause*.)

Had it not been for you America would have been nothing. (*Applause*.)

We are grateful for our forefathers - the early settlers from Spain, the pioneers from England, the sturdy Irish, the Huguenots from France, those who came with Pastorius from Germany, the Scandinavians who are building up the great northwest - to all these we owe acknowledgment.

They have helped us, and are now helping us, to make America what it is.

Mr. de Timonoff, Mr. Charguéraud, Mr. Sanjust di Teulada, Captain Matsumura, have been good enough to refer in terms of pleasure, if not of surprise, to the advancement in this country of the poor German boy who now occupies the high office of Mayor - the burgomaster - of this great City, Rudolph Blankenburg. (*Applause*.) It is agreeable to us that they should have done so. We have an interest in the Mayor. Indeed, we had designs upon you when we asked you to come to the City of Brotherly Love with this great convention. We had in reserve amongst our million and a half of people, the man who would measure up to the tribute paid by the distinguished Director of Public Works of Germany, Baron von Coels, and we looked forward to your coming, in order that we might have him welcome you. We had him distinctly in view, for we knew no matter how many languages you might speak, our Burgomaster Blankenburg would be able to talk to you in your own tongue. (*Applause*.) It was a part of the scheme by which we hoped to make your welcome intelligible and secure. (*Applause*.)

Four years ago we ventured our request that you come to the United States. We supplemented that request by formal invitations from the President and Congress of the United States, the Governor of Pennsyl-

vania and the Mayor of Philadelphia. We wanted you to come to America and Philadelphia. Why? First because we wanted you to know us better and we wanted to know you better; and second because we wanted you to better understand the spirit of progress which animates Americans, the offspring of your countries, the descendants of your own forefathers.

Ours is a nation of a century and a quarter's growth. Your nations have passed through the experience and changes of many centuries. We were young and wasteful; you had profited by the wisdom of the ages. We wanted you to fraternise with us and look us over to see if we had done well. We desired to know by information and by contrast whether we had made successes or mistakes; whether we were building permanently, or only for the period of convenience. In the study of waterways we have learned of the commercial courage of your governments in appropriating money for large works. You have not hesitated to equip your ports for the accommodation of the navies of commerce and war. We have excelled you in our Panama Canal, and in this we have been lavish of expenditure; but in providing ports of entry for the commercial struggle of the nations you have taught us much. You have also given us valuable object lessons in internal improvements. You have not stinted yourselves in providing means for internal development and for the encouragement of agriculture and industry. To a large extent you have met the problem of terminals; your railroads and your waterways are made to work together; they are the servants of industry.

In the United States our difficulty has arisen largely from the vastness of our area and the supposed inexhaustibility of our resources. We have fifty thousand miles of inland waterways, only one-half of which are navigable; and because of the commercial raid upon our resources we have neglected many of our actual means of communication. In all our history as a nation we have not spent upon our rivers and harbors as much as France alone has spent in the last century.

We are now beginning to take leaves from the experience books of England, France, Germany, Italy, Hungary, Russia, Belgium, Sweden, Holland, Japan, the Netherlands and other great countries, with regard to the utilization of inland waterways; we are rushing into new problems of transportation and motive power. As population increases the ingenuity of man is developed and we are all seeking to keep pace with the procession. That we may mutually, and for our respective countries, derive advantage from such friendly intercourse as this assemblage must encourage, is our hope and aspiration.

This great Convention, perhaps the most diversified and notable in its distinguished personnel, ever held in America, is therefore welcomed with cordial goodwill by the City of Philadelphia and the State of Pennsylvania, it should prove the inspiration of a new era of wise and scientific development of the means of communication in the United States and throughout the world. (*Applause.*)

If we, and the people of the United States whom you are yet to visit, are successful in demonstrating to you, — the engineers and constructors of the world's great works — that we have fully appreciated the high honour and favour of your visit to Philadelphia, let us assure you that your presence has been a pleasure and a delight, and that we believe your deliberations will prove a beacon and a benefit in the adjustment of the transportation problems of the future. (*Applause.*)

My friends, the Mayor has paid to me the signal compliment of pointing me out as one who aided in bringing this Great Congress to Philadelphia. Many others have been associated with this work — strong, earnest, active Americans — who sprang from your ancient forebears; men who look back with pride to the “mother countries” under whose flags you still strive, and under which you are winning your way to honor and to glory. These men wanted to come; they wanted to meet you face to face; they wanted to shake you by the hand; they wanted you to greet the American engineers and the great citizens of America so that you might know and appreciate them better.

They have done the best they could. They are not yet through and there is more to come. For two or three days you will still be the guests of the citizens of Philadelphia and Pennsylvania. We shall expect to show you more of our great works. We shall want you to continue to meet our good people and to enjoy, so far as you may, such hospitality as we may be able to dispense.

And now as I close, may I speak of the heart throbs beating tonight? Surely, men and women of distant lands, there is a touch of kinship about this board which makes us feel the kindlier and the better toward each other! And why should it not be so? We are so alike! When the nations' shield is removed and we are together as man to man, it is as brother to brother. You are far from home, and yet in this presence we would have you feel that this is home. May good fortune attend and carry you safely over the seas, and may this occasion be but the forerunner of greater progress and a better understanding amongst the peoples of all climes. (*Long continued applause.*)

Mayor **Blankenburg** (in English) :

Gentlemen, I know you have been pleased with the eloquent remarks of my friend and your friend, J. Hampton Moore. We have heard from the United States Army and I think we should also hear from the United States Navy. I take great pleasure in asking Admiral Knight to speak to you.

Admiral **Knight** (in English) :

Mr. Toastmaster, ladies and gentlemen, delegates to the Congress of Navigation,

Some men are born orators, some achieve oratory and some have oratory thrust upon them. I have had oratory thrust upon me in the last three minutes. I accepted the invitation to be present at this gathering with a distinct understanding that I was not to be called upon for a speech; however, three minutes ago I was notified that I was to be called upon by the Toastmaster, and if that is what he calls brotherly love it is not mine.

Mayor **Blankenburg** (in English) :

We are satisfied.

Admiral **Knight** (in English) :

Ladies and Gentlemen,

I am asked to speak for the United States Navy. It seems to me unnecessary for anyone to speak for the Navy of the United States because it speaks for itself. However, Philadelphia has been speaking for Philadelphia, and Pennsylvania has been speaking for Pennsylvania which has been speaking for itself for a century and a half, and therefore it seems perhaps not altogether improper to say something about the Navy to this assemblage, because you gentlemen have gathered here to represent and forward the interest of a cause which, after all, in the last analysis is not very different from that for which the Navy stands.

In the last analysis, perhaps, your mission here is a mission of peace and of goodwill. The gathering together of so many representative men from nations so widely separated can certainly have no other effect more important or valuable than that of bringing the nations which you represent more closely together and, therefore, forwarding in a very practical way the interests of peace.

It may seem at first thought a little anomolous to speak of the United States Navy as a beacon light for peace, but I want to assure you that the United States Navy does distinctly stand for peace and nothing else in the world so much as for peace. (*Applause.*)

Some of us sometimes think of the great armaments, and all that is said on this subject of which the world is so full now, as being intended for threats. They don't represent any spirit of that kind. Certainly our Navy does not, and I certainly know that the navies with which you are associated don't either. They represent a condition of preparedness for such events as may arise, and nobody knows what that may be, which

makes for self respect among nations. It is a precaution to preserve the self respect of one nation which desires to regard itself with respect, and to hold mutual respect among nations; one of the other.

As I look back, twenty, thirty, forty years and I won't say how many more, I may recall the experience which my country has passed through in her relation with other nations, and as I recall the attitude which the world has, in many cases, assumed toward my country, I realize that we have not always been, in the sense in which the term is used, a war power such as we are now, indeed, a great war power. If the United States is such today in the sense it has never been in this respect before, I ask you if it is not, in a very large measure, due to the United States Navy, the achievement of the United States Navy and the magnitude which the United States Navy has assumed within the last twenty years or a little more. I ask you if it is not very largely due to that—that the United States is today recognized as one of the very foremost powers of the world; as one of the very foremost influences for peace and goodwill in the world? I believe that to be the case. I look back some years and recall one or two instances which it would not be wise to refer to just now, where the United States Government has had the good fortune to exert a very marked beneficent influence as an intermediary between other powers.

I recall a Congress, and some of you gentlemen may have been present, which took place at Algeciras, where the United States was not at all interested but was requested earnestly by the powers to send a representative, and that representative was consulted upon many points, and it was currently stated at the time that his influence was largely instrumental in overcoming many of the difficulties which existed at that time.

I ask you if that was not the result of the United States some years before that entering the arena of world politics, backed by a Navy which commanded the respect of all the nations in the world?

There are many other questions which occurred and to which I will not refer here now, where the United States has been able sometimes to act as an intermediary between the great powers as well as the smaller powers in which this country has exerted a very beneficent influence, and I hold that it is the United States Navy which is very largely responsible for the attitude which the United States has been able to assume in the councils of the world.

There is another sense in which it is possible that the United States Navy stands as a power, which are the interests which you gentlemen represent. The United States Navy stands for construction along certain lines on a large scale which are specialized, scientific and constructive. It seems to me that there is little in the world which represents a greater triumph of engineering skill and ingenuity than does a modern battleship, I wish it might be within my privilege to meet some of you gentlemen and welcome you on the deck of the ship that I have the honor to command, and especially on the deck of one of the great Dreadnoughts. I wish that I might have the pleasure of showing one of those great ships,

to show you that the United States Navy, and all the world, do stand for a very high order and a very scientific order of construction, along lines which are not widely different from those in which you are more immediately interested, among the very great engineering works in which the world is interested today.

I believe it would not be too much to say that among the greatest is the Panama Canal. The Panama Canal, of course, is built in the interests of commerce. Nevertheless, I doubt very much if the Panama Canal would now be as far advanced as it is if it hadn't been for the United States Navy and for the desire which was felt by our people to make it easy for the vessels of the United States Navy to pass from one ocean to the other, from one coast to the other, and extend its influence on the Pacific as well as on the Atlantic Ocean. I don't look, however, on the Panama Canal as an adjunct to military power; it is not that. Nevertheless I think the United States Navy and the necessities of the United States Navy have contributed very largely to the construction of the Panama Canal, though doubtless it would have come in any case.

You gentlemen have come to the United States from nearly all the countries of the world and you are about to return to your homes. I would like you to take back with you the thought that, in so far as the United States of America is well represented by its Navy, it stands for peace and desires to stand for nothing but peace. The United States Navy is never intended and never expects to be used as a threat against the peace of the world or the rights of another nation; or does it ever expect to be called upon to exert itself against another nation. We believe, as long as we have such a Navy as now, with the material character that it has, with the history and tradition belonging to it, that it is bound, so long as we have that, to continue to be what I said in the beginning, a potent influence for peace, and we hope that it may long be successful in preserving the peace of the world. (*Applause.*)

Mayor **Blankenburg** (in English) :

There are one or two gentlemen whom I intend to call upon to say a few words. They are anxious to express for their own countries their appreciation of what has been done in this International Congress of Navigation by the City of Philadelphia, the State of Pennsylvania and by the United States. I will now call on Professor Merczyng.

Professor **Merczyng** (in English) :

Mr. Chairman, ladies and gentlemen,

We all know that the meaning of the name, Philadelphia, is "Brotherly Love," but not all the people know in what manner this principle was practised, not many years ago by the citizens of Philadelphia aided at that time by the present Honorable Mayor of this lovely City.

During the time of the famine in Russia he came, personally, to help our unlucky people and he came in the spirit of Brotherly Love.

In the name of the Russian delegation, and twenty of us are here, I wish to express a desire that this principle of Brotherly Love shall always exist between us, between all the people, and especially between the people of the United States and the people of Russia, and in closing I wish to give our thanks for the lovely reception we have had in Philadelphia.

Mayor **Blankenburg** (in English) :

Let me call a gentleman who represents the old country of Hungary. I don't believe any man ever received a greater welcome in the United States than did General Kossuth. However the old wounds have all been healed as between the great countries, and I will call upon Mr. de Kohanyi.

Mr. de Kohanyi :

Mr. Chairman, ladies and gentlemen,

If anybody representing any of the great nations of Europe wants to say anything he wants to say it in his own language, but he may not be quite sure to be understood, at least by the greater part of the audience. I positively know that nobody would understand me if I tried to say something to you in my own language, and, therefore, I am not so fortunate as to be able to say anything in my own language. I will, therefore, say something to you in English.

In his inaugural address the President of the United States made the remark that "he thinks that young America may learn something from old Europe." Well, I want to say that we must wait many years to study some of these questions, and to learn what we have learned in eight days in America. First of all, we learn to work much more quickly than we generally did. We have also been privileged to admire the characteristic feature of the wealth of your nation. You don't enjoy the possession of fortune but you enjoy the making of the fortune. Everyone of those making a fortune knows very well that the country has strength and that the strength of a nation depends upon the citizens, and by making their own fortune they are always advancing the worth and the wealth of the whole country. We learned one thing more in this country. We learned that the struggle of the people in America, the daily struggle for life, does not exclude people from doing something for the benefit of their own country; that they all possess a big heart full of the most noble human feelings. We have encountered the most generous hospitality since we arrived in Philadelphia. As soon as we set foot in America we felt we were not only the guests of the Federal Government or of the State of

Pennsylvania; not only the guests of the City of Brotherly Love, but the guests of a noble and of a high minded and of a warm hearted nation as a whole. (*Applause.*) So I won't thank, at this time, the official government; I won't thank your representatives of Pennsylvania, I won't even thank the leading men here, though I should very much like to thank them all, personally, one after the other, but I wish at this time to thank the whole nation. (*Applause.*) I should like to express a wish. We part tonight; we are on the eve of departure from here, but we hope to come back again, and we hope and we wish that when we come back again, which may be as soon as possible, your wonderful country, your great State, and your wonderful city may be built up by that time to a height of development which today is only outlined in the dreams of the best, of the leading men, of this City of Brotherly Love. (*Long continued applause.*)

Mayor **Blankenburg** (in English) :

When I was in Russia twenty years ago I spent one of the most delightful evenings of my life with the family of Count Leo Tolstoï in Moscow. As we separated he said to me there is nothing nicer in this world than to meet people and to learn to love and esteem them and there is nothing harder than to say "we must part; perhaps never to meet again." I won't say that tonight, I will say to you, my friends au revoir, in French; I wish you my fellow German citizens (in German) "when men are together and part then they speak of the time when they shall again see each other."

Therefore I say to you all, members of the International Congress of Navigation : We have enjoyed your presence here and we hope you have enjoyed it as much as we have, and may the deliberations of this Congress redound to the benefit of mankind for all time to come and may we all meet again in the near future to perpetuate the bonds of friendship that have here brought us together. (*Loud applause.*)

The published program for the afternoon 28th May comprised automobile rides to Fairmount Park, University of Pennsylvania, Commercial Museum, and other points which any of the members had not seen and might desire to visit before leaving Philadelphia. Later, however, an invitation from Mr. Horace Vogel, President of the Philadelphia Base Ball Club, was extended the members to witness a base ball game between the Philadelphia team and the Boston team. As this was a novelty to the foreign members, the invitation was quite generally accepted and the visits mentioned in the programme were for the most part given up.

Entertainment of the Ladies of the Congress at Philadelphia.

One will judge of the activity of the Ladies' Auxiliary Committee, appointed by His Honor the Mayor of Philadelphia, by the following report of their work which was furnished by its President, Mrs. Cornelius Stevenson, who is entitled to great credit for the effective and intelligent work of the Committee :

"The ladies appointed — other than the wives of the active members of the Congress, who may be regarded as the real hostesses by virtue of their connection with its leaders — were among the



Concrete arch bridge spanning the Valley of the Wissahickon
at Walnut Lane, Philadelphia.

most representative women in the city. Many were presidents of Clubs and of important institutions which it was believed the foreign visitors would like to inspect; and the Committee of 75,

was divided into sub-committees in charge of the various entertainments or expeditions. Thus, although the Congress lasted from May 22 to May 28, and every day some function was provided for every part of the day, the division of responsibility was such that fresh committees received the city's guests at each point, making a pleasant variety for the visitors and saving the hostesses undue exertion.

To Mrs. J. C. Sanford, Chairman of the Sub-Committee on Hospitality, was due much of the success of the various functions, as upon her and her able Sub-Committee fell the duty of escorting the visitors to the different places in and out of Philadelphia where they were expected. On certain days, when many points of interest were visited, and luncheons and several receptions followed one another in close succession, the responsibility of moving so large a body on time was a serious undertaking, and no greater tribute could be paid to this Sub-Committee and its able Chairman, than the mere statement that not once, in the fifteen or more appointments kept, did the visitors fail to arrive on, or close to the appointed time.

The liberality of the Executive Committee in placing the required funds and necessary motor cars at the disposal of the ladies, as well as in reserving for their use boxes and choice seats for the general functions of the Congress, and the never failing courtesy and assistance of its Chairman, Mr. Holton, and of the various chairmen of the gentlemen's committees—notably of Messrs Kolischer and Dodge, the members of the Executive Committee in charge of the Ladies—alone made it possible to carry out the program adopted by the Ladies' Auxiliary Committee. This was passed upon at its first meeting. It was adhered to strictly and without alteration—save in the case of personal changes due to deaths which brought sorrow and mourning to some of those who, like Mrs. Alexander J. Cassatt and Mrs J. Heide Norris, had accepted the Chairmanship of Sub-Committees. Mrs. Charles C. Harrison, however, kindly consented to take charge of the reception at Stenton, the headquarters of the Society of the Colonial Dames of America; and Mrs. William Yorke Stevenson took charge of the Luncheon at the Country Club for which Mrs. J. Heide Norris, as the wife of the Chairman of the House Committee of the Club, had arranged.



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Miss Elizabeth Lowry, President of the New Century Club, with an able Sub-Committee, was hostess on the occasion of the first entertainment given by the Ladies Auxiliary Committee on the 22nd. On the next day—that of the formal opening of the Congress by President Taft, which the ladies attended, when they afterward were welcomed by the President of the United States—an elaborate luncheon was given by the Committee of the whole at the Bellevue-Stratford Hotel, when a brief address of welcome was delivered in French by the President of the Ladies' Committee, Mrs. Cornelius Stevenson, who invited the wife of the Mayor, Mrs. Blankenburg, to preside. This Mrs. Blankenburg kindly consented to do, and in a few gracious words of welcome greeted the visitors.

A cordial response, gracefully expressed, was made on behalf of the ladies of the Congress by Madame Van der Sleyden, of Holland, Madame Crahay de Franchimont, of France, Madame Richald, of Belgium, Mrs. Anderson, of Canada, Mrs. Yorke, of England, Madame Van der Linden, of Belgium, Frau Thoholte and Frau Schilling, of Germany, and by Mrs. Bixby, on behalf of the visiting ladies from the United States. Nothing could have been more gracious than the manner in which all concerned acknowledged the hospitality offered.

On the 25th the ladies visited Independence Hall where they were received by the Committee officially in charge of the edifice, through the kindness of Mrs. Chew, Judge Mitchell, Judge Staake, Mrs. Hampton Carson and Mrs. Charles C. Harrison. Mrs. Harrison also received them later with a committee of ladies at the University of Pennsylvania. On that day a luncheon was given in their honor by the Committee at the Acorn Club, when Mrs. Arthur H. Lea was in charge, assisted by Mrs. Wilmer Biddle, Mrs. Charles L. Borie, Mrs. George H. Frazier, Mrs. John White Geary, Mrs. William McLean and Mrs. Griscom.

On Monday 27th, the day was spent in the Park. "Sedgely", the Women's Boat Club, was reached at 10.30, and after a short visit the party proceeded to the historical Arnold Mansion, now the home of the Woman's Automobile Club, the Esperanto name of which is "La Moviganta". In the absence of the President, Miss Margaret L. Corlies, owing to illness, her Sub-Committee, consisting of Mrs. Charles C. Harrison, Mrs. George Dal'as Dixon, Mrs.

Charlemagne Tower, Mrs. J. B. Lippincott, Mrs. William Ellis Scull, Mrs. Stanley Flagg, received the visitors, who then proceeded to Stenton, as already mentioned, and stopped for luncheon at the Philadelphia Country Club.

Here luncheon was served on the terrace, and Mrs. William Yorke Stevenson, Mrs. Henry M. Fisher, Mrs. Stanley Flagg, Mrs. Charlemagne Tower, and Mrs. J. B. Lippincott did the honors of the occasion. After the luncheon the party divided, some of the younger guests remaining to see the opening game of the Polo season at the Club, and the wives of official delegates going to Memorial Hall in the Park, where a formal reception in their honour was given in the rotunda of the Pennsylvania Museum and School of Industrial Art. Here the ladies were joined by many of the gentlemen of the Congress, and by the ladies who had lingered at the Country Club. The weather was perfect, Fairmount Park was at its best, and a large and brilliant attendance invited to meet the City's guests was received by the Committee, and the Associate Committee of Women of the Board of Trustees of the Pennsylvania Museum and School of Industrial Art.

On the last day, Tuesday the 28th, Mrs. Clement A. Griscom opened her handsome country place at Haverford, and gave an informal Garden Party which was much appreciated by her guests. This gave the foreign ladies an opportunity to visit one of the most hospitable mansions of Philadelphia's noted suburbs. They stopped there for an hour, under Mrs. Sanford's guidance, on their way to Bryn Mawr College, where the President, Martha Carey Thomas, and the members of the Faculty received the ladies on the Campus. Tea was served, after which a chance was given them to view the buildings, notably the beautiful Library and the cloisters. Again, the weather was ideal for a country excursion, and the guests regarded the last two days spent in the open as the most truly enjoyable of the very full week. Many of the foreign ladies since their return home have written kindly and much valued words of appreciation; and the Ladies's Auxiliary Committee feel that their time and labour have been well spent, and that they are fully rewarded by the pleasure of meeting so many charming women with whom a pleasing memory has formed a lasting bond.

Excursion to Washington, Harrisburg and Pittsburgh.

About 220 Members of the Congress left Broad Street Station, Philadelphia, on a special train provided by the Pennsylvania Railroad Company to take part in the trip organized by a special Committee of the Local Organizing Commission, of which Mr. James B. Bonner is the Chairman and Mr. George F. Sproule Secretary and Treasurer.

The train was composed of nine sleeping cars and two baggage cars, which arrived at Washington very early in the morning, but was placed on a siding for a couple of hours, in order that the party should not be obliged to curtail their sleep. Breakfast was



Union Railway Station, Washington.

served in the fine new Union Railway Station. After breakfast a number of large "sight-seeing" automobiles carried the party to a wharf on the Potomac river, where the steamer "Chas. Mc Alister" took them about 15 miles down the river to Mount Vernon,

the home of General George Washington, who commanded the American armies during the war of the revolution, and who was afterwards the first President of the United States. The estate of Mount Vernon which was occupied by the great statesman is now owned by the Ladies Association of Mount Vernon, and is kept in good condition by them with the utmost care. This Association was organized in 1860 to purchase and maintain the estate with the historical relics there preserved. All the States of the Union desired to be represented in it.

Although it was raining slightly, the party inspected the house occupied by Washington, the interior having been left in its original condition. They stopped before his grave, on which Mr. de Timonoff laid wreaths, and rendered the following tribute to the great man :

Mr. de Timonoff (in English) :

The Twelfth International Congress of Navigation has reached the most important point in its visit to the United States, as its members are now at the resting place of the greatest American citizen, George Washington.

The influence which this country has exercised on the thought of the entire world is fully appreciated : and in viewing the United States as it is to-day, we naturally think back to those who made this great nation possible. It is the chief of those founders who lies here. Washington's greatness was recognized in Europe while he lived. After his death this recognition became general. Washington is an International hero — one whose work has benefited the world at large. On behalf of all nations represented at this Congress, I lay this tribute on his grave.

Mr. Boutteville then deposited a wreath on the tomb of Washington in the name of the French delegation, and spoke the following words in French.

Mr. Boutteville :

Ladies and Gentlemen,

The historic bonds which unite so closely the two great sister republics, the United States and France, and which have left such a vivid impression in our hearts, imposed a duty upon the delegates who had been sent to the XIIth International Navigation Congress by the French Government, of placing on the tomb of George Washington the great citizen, the Father of the American nation, this wreath as a modest symbol of our admiration, and the testimony of the earnestness of our ancient friendship.



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Telephoto from the top of the Washington Monument, one mile distant.

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During the return journey, luncheon was served on the boat to the members of the Congress, and on their arrival at Washington they were presented in the White House to His Excellency W. H. Taft, the President of the United States. They were received most cordially. After this reception the party was shown the most interesting buildings and streets in Washington, including the National Capitol, where its various rooms were visited. The United States Congress (or Parliament) being then in session, the proceedings of the Senate and House of Representatives were listened to. As arranged by the Hon: J. Hampton Moore, President of the Local Organizing Commission the Hon : Champ Clark, Speaker of the House of Representatives, received the members with a few words of welcome in his private office, each member being presented to him. The new and handsome Congress-



Hall of House of Representatives, State Capitol, Harrisburg.

ional Library, renowned for its beautiful construction and the wealth of its collection, was then visited. A dinner was served in the evening, after which each member amused himself in the town in such a way as seemed most agreeable to him until their train

arrived. At midnight the party met at the station and boarded the train again by which they had reached Washington, and left for Harrisburg.

The members arrived early at the latter town on the following day, May 30th. The weather was cooler and the night was more comfortable than the previous one. After breakfast which was served in the station, the members strolled individually or in small parties about the city until 9 a. m. when they assembled at the State Capitol of Pennsylvania.

They were first conducted to the Governor's office, where they were received by him and other State Officials and members of the staff. They then walked into the hall of the House of Representatives, where the State officials and the members of the Congress who were to speak took seats on the platform, while the others occupied the representatives' seats. The Hon: J. Hampton Moore, acting as Chairman of the meeting, introduced the various speakers in rotation, and opened the meeting with the following remarks :

The Hon. **J. Hampton Moore** (in English) :

Ladies and Gentlemen,

You are assembled in the House of Representatives of the Commonwealth of Pennsylvania, as the guests of the Governor of this State. He will, in due course, welcome you to the Capitol and to the great Commonwealth which he represents. For the present we shall have words of welcome from the City of Harrisburg, in which the Capitol is located, which will be delivered by his Honor, the Mayor of the City of Harrisburg, John K. Royal.

Mayor **John K. Royal** (in English) :

Ladies and Gentlemen,

As the Chief Executive of this city, it gives me great pleasure this morning to bid you welcome. I, like every loyal son of Harrisburg, am proud of our city and of what it has accomplished. We have here a city covering about seven square miles, with a population of about seventy thousand. We have seventy miles of paved streets which are kept clean and are well lighted. We have our own municipal water plant, with a



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capacity of twelve million gallons per day, which furnishes the purest filtered water that can be obtained anywhere. We also have a sewage system of about eighty-seven miles and are now reconstructing that system so that, when it is finally completed, we will have one of the finest sewer systems in the world. This is an old town, and for many years it was, so to speak, asleep. About ten years ago it woke up, realizing its position as the capital city of the great State of Pennsylvania, and set about to do things. We have spent over three million dollars in the way of public improvements in the last ten years. Our people are glad that they spent the money and they are willing to spend more. They are contented and happy. We are known here as we are termed, a convention city. Large gatherings meet here almost every week. We have had many distinguished people within our gates but I doubt whether ever so large a body — I am satisfied that there never was so large a body of distinguished persons present as we have with us this morning. You do us a great honor by your presence here and I only regret that your stay is so short that we cannot show you some of the things that we are so proud of and which we would be happy to show you. The city is well located and from a scenic standpoint is beautiful. The broad Susquehanna, almost a mile wide, passes by our doors. I am told that the scenery along these banks is equal to anything which you will see in your own beloved countries. Just five miles to the north is the largest stone railroad bridge in the world, which carries the wheels of the Pennsylvania Railroad Company. On behalf of the citizens of this city, in closing, I will repeat and bid you a hearty welcome to our city, and may your stay be one of pleasure as well as improvement; and I wish to assure you that we appreciate the honor which you have shown us in coming here. (*Applause.*)

The Hon. **J. Hampton Moore** (in English) :

The splendid Governor of the great Keystone State (1) intended to welcome you who came from foreign countries at Philadelphia when the Convention opened last week, but his physical disability incapacitated him, and his welcome on that occasion was delivered to you by the Attorney General of the State, Mr. John C. Bell.

The Governor desired you to see Harrisburg and he desired that you should come to the Capitol. He wanted to take you by the hand and he wanted to give you a Pennsylvania welcome. He is doing that today and he will do it in his own way; in this, one of the most magnificent buildings in the world, the Governor of Pennsylvania will address you and I now take great pleasure in presenting to you his Excellency, John K. Tener.

(1) Pennsylvania is called the « Keystone » State by Americans because it was the seventh of the thirteen states of the original American Union.

Governor **John K. Tener** (in English) :

Mr. Chairman, Mr. President, members of the International Navigation Congress, and ladies and gentlemen,

Many of you, perhaps the majority of you, come to us to-day from afar. You have come to our Country and to our State on a visit that is purposeful, yet I have no doubt many of you are here as well on pleasure bent. I sincerely hope that as you have been met and have been greeted by our citizenship of Pennsylvania as well as by the Chief Executive of our Nation, in Washington, whom you met yesterday, that in the very look of the eye and in the warm grasp of their hands you have experienced a knowledge of the true welcome in this, a strange land to you, and among a people who are strange and who have strange customs. You come to us here in Pennsylvania at this time and we welcome you. It is well land fitting that you do come to Pennsylvania, because while your mission is especially connected with waterways and with water navigation, yet you must know that here in Pennsylvania was founded the first government which was based on peace and brotherly love and that government, established by William Penn, the founder of the State, remains with us today in Pennsylvania.

We do welcome you here and we do sincerely hope that during your stay in Pennsylvania, and as you come and go through the confines of this State, you will not only enjoy yourselves but that you will learn of us, as we are to-day and as we have been, since the meeting of your Congress, learning of you. As you are here to-day in the great majority from abroad we feel that yours is the greater knowledge: that yours is the greater intellectuality, we might say, on the subject in hand, the object and purpose of your visit here. Hence, while the honor is ours in having you, the advantage as well is ours in having you, in that you have the more to give us and we the less to impart to you.

You have heard, I am quite sure, at your previous meetings, of Pennsylvania and her waterways; how she is especially favored with her inland waterways in the western part of the State, with her lake port and her sea port. It is true that improvements on the East in Pennsylvania have been neglected for some time and for many years, and Philadelphia does not have that important place which is due her in the world's commerce, but we believe, from the interest that is created or as the situation is understood and realized in Philadelphia and the interest that is taken by her representatives and through you, you will manifest to her people and to the people of the United States that Pennsylvania and Philadelphia particularly will soon take its proper place as one of the most important and one of the greatest ports of all the world. We have been giving more attention to the national waterways; that is, through the generosity of the National Government, to the improvement of our inland waterways, so far as these improvements are beneficial to Pennsylvania. In the western part

of this State, as you will observe tomorrow, there are three great rivers: The Ohio, the Monongahela and the Allegheny Rivers. Here you will find improvements and here you will find waterways that are being utilized and streams that are carrying freight and heavy burdens as well as the more precious freights. Coming, as I do, from the western part of the State, and knowing, as I have from year to year, of the enormous tonnage that is carried down the Ohio River, amounting in coal alone to ten million tons annually, seventy-eight to seventy-nine per cent of which tonnage is consumed in Pittsburgh and is transported altogether from the mines to the point of consumption by river, you will realize at once that western Pennsylvania and Pittsburgh does take advantage of its river improvements. While some of us may think that all the coal that is used in the western part of the State shipped by water finds its way to the markets of the lower Ohio and Mississippi, the fact remains that nearly all the output is consumed or delivered in the Pittsburgh harbor.

Ladies and Gentlemen, I am delighted to have this opportunity of welcoming you here in the capitol city of Pennsylvania. I would like to talk at length to you of Pennsylvania's proud place in the galaxy of states; of her proud record; of her history. For, be it known that Pennsylvania has done more for the development of this nation than any other state in the Union. (*Applause.*) Every great epoch in the Country's history has been made here in Pennsylvania. I trust that your stay here with us will be pleasant and that as you leave this capitol city and go on to the great beehive of industry, the industrial city of the Country, to Pittsburgh, you will continue to enjoy yourselves and you will feel as you leave us and our borders that here in Pennsylvania these people have endeavored to show you that we are brothers; that we are believers in the brotherhood of man and that to-day you are just as welcome as our own people. We are glad to have you at our tables and glad to have you at our firesides, and we hope that you will come again. I thank you. (*Applause.*)

Chairman **Moore** at this point, gave way to Governor Tener, who spoke as follows :

Governor **John K. Tener** (in English) :

Ladies and Gentlemen,

I have asked the former Governor of this State to speak for a few minutes and requested him to be with us especially for this occasion, because it is well understood, among those of us who know, that no man in Pennsylvania is better able to speak of this great State, her past, her present and what she promises for the future, than he who formerly occupied the position in this Commonwealth which the speaker does for the present.

I have special pleasure, therefore, to present ex-Governor Samuel W. Pennypacker.

Ex-Governor **Samuel W. Pennypacker** (in English) :

Mr. President, ladies and gentlemen,

In a spirit of kindness and self-abnegation our worthy Governor has invited me to speak for a few minutes in this Capitol of the State of Pennsylvania on behalf of the State which in some respects differs from all the other Commonwealths. Most of the states have one great municipality about which is centered all their interests and which is their power. In Pennsylvania we have two such municipalities, and it is the only State of all of them which can point to a great centre of activity in the East and another in the West. You visited one of these cities where you held your Convention, and you are now about to cross the Allegheny Mountains to visit the other municipality, Pittsburgh, in the West. There is another respect in which Pennsylvania differs. Naturalists tell us that vital activities are always increased by the blending of the allied stocks. This is true of mankind as it is in all nature. If you will look at the early civilizations you will find that they have all grown up in some locality because of a special richness of the soil or especial facilities for commerce. This principle governed a gathering of the tribes from the neighbourhoods in past ages there to meet, and there the men from Egypt and Greece and Rome and in the Island of England, met and opened up those civilizations that the philanthropy of William Penn produced here; and we have more different places where they have gathered together in the State of Pennsylvania than in any one place on the Continent. The first to come were the Dutch. I noticed in the line which passed us a few minutes ago that there were a number of men and that there were a number of handsome women who had come from Holland. I am a representative of the country myself from an ancestry of a long time ago. The next to come were the Swedes and then came the Germans. At least one third and perhaps one half of the people of Pennsylvania have German blood in their veins. I observed in that line many representatives from Germany. The military reputation of Pennsylvania is represented in the Capitol at Washington by the statue of Peter Muhlenberg, whose father migrated to Pennsylvania from Germany, here to organize the Lutheran Church. After that came the English Quakers and the Welsh Quakers and the Scotch-Irish and, and last of all, the Irish. The English have thought that Irishmen are incapable of self-government, but when they come over to this country we make of them Presidents, like Andrew Jackson, and governors of commonwealths and it is unnecessary for me to point out to you how successfully they perform their tasks.

William Penn in his spirit of prophecy said that « My God will make it the seed of a nation. » You will find it written about the dome of this Capitol and the prophecy promises to be a truth.

If Virginia had controlled the affairs of this nation we should have had an established Church and an imitation of the court of Charles the Second. If Massachusetts had controlled this nation, we should have had an established Church, part of it devoted to Calvinism but still an established Church, and their spirit is known by the fact that they excluded every one who differed in their views from their colony. But William Penn invited all those peoples with all these creeds to come and worship God as they chose. That doctrine was put into the Constitution of the United States, and this great nation is but an enlargement and extension of the thought which led to the settlement of Pennsylvania.

When the greatest of the sons of New England started out upon his career—I refer to Benjamin Franklin, he became a citizen of Pennsylvania and came southward. When the greatest of the sons of the Southland followed his career—I refer to George Washington—he came northward; and these two great men both devoted a great part of their lives to their Country upon the soil of Pennsylvania. In the Revolutionary War, Robert Morris was the manager of the finances.

In the War of 1812, when the National Government was almost at the end and ready to surrender for the want of a loan of five million dollars, and when they tried to get subscriptions which did not amount to over two hundred thousand dollars, Stephen Girard came to the front and took the whole loan of five millions of dollars.

Among those of you who were in the line a little while ago I saw many men from France, and amongst our people Albert Galatin, the Frenchman of the West, was Secretary of the Treasury under Thomas Jefferson. Stephen Girard erected the greatest and best endowed institution of learning in the whole United States. The finances of the War of the Rebellion were managed by Jay Cooke.

Three of the most important events in all American history, the Declaration of Independence, the adoption of the Constitution and the Battle of Gettysburg, all occurred within the limits of this one great Commonwealth. (*Applause*). But it is not my purpose to detain you. I might go on telling you about the achievements of this great State until you were weary. It has now eight millions of people, twice as many as there were in England at the time of her greatest glory under Queen Elizabeth; twice as many as there were in all her colonies at the time of the Revolutionary War. Her revenues amount to thirty-two millions annually. She gives seven million five hundred thousand dollars to public schools every year, as much to charity every year and she has twelve million dollars in her Treasury.

Some years ago when I was Governor of this State I was down in Georgia. There I met and talked with the Treasurer of that State. I said to him, "How long is the State of Georgia?" He said, "Four hundred miles long." That is longer than Pennsylvania by one hundred miles. I asked him "How wide is the State of Georgia?" He answered, "Three hundred miles wide." Which is one hundred miles wider than Pennsylvania. I

said to him," "What are your revenues?" and he said, "One and a half million dollars a year, but we have to spend a great deal to pay interest on our debt." He then said, "How much are your revenues?" I said, "Twenty-five million dollars a year." He then said, "How much is your debt?" I answered, "Nothing." The Southerner threw up his hands and said, "Great God, twenty-five millions of revenue and no debt." Now, ladies and gentlemen, that illustrates the condition of things in this Commonwealth, and if you want to see an illustration of it look about you at this beautiful room, this impressive Capitol Building, adorned with the works of Abbey, of Barnard, and of Annie Oakley. All this was executed and built within a space of four years, paid for and not a cent borrowed and no special tax imposed upon the citizens of the Commonwealth; and when it was completed there was just the same amount in the Treasury of the Commonwealth that there had been when it was undertaken.

Such a financial achievement has never been equalled in this Country and I doubt very much whether you can find its equal in your own. This represents the spirit of the people whom you are meeting today, and I unite with the Governor in the expression of the hope that you will enjoy your visit and may see something here which appeals to you, and that when you go to your homes you will look back with kindness to this State of Pennsylvania, which, through its Governor, to-day entertained you. (*Loud Applause.*)

Hon. J. Hampton Moore (in English) :

Governor Tener told you that this was an era of peace and goodwill; that he welcome you to the Commonwealth of Pennsylvania and that the welcome was extended in the spirit of progress and peace.

The Governor desired me to say to you, supplementary to what has already been said, that while this is a peace loving Country, we have respect for those who go out in times of war to fight our battles that we may have and maintain peace. He wishes me to remind you that this day is the day set apart in the United States (Decoration Day) for the laying upon the graves of the soldier dead, those who fought in the armies and in the navies of the United States, the flowers, the flags, the tributes of respect that the rising generation pay to those who fought valorously in order that the union of this Country might be saved.

You have come to the Capitol of this Commonwealth upon a holiday; not a day for rejoicing, or for peace, but a day when solemnly and soberly and seriously, with love and reverence and affection, those of us, from the great Governor of this State down, lay upon the graves of the men who fought in the wars of the past the emblems of respect and of love. The Governor wanted this announcement made. You will see the flags flying, the monuments decorated and you will see the people quietly, silently laying garlands upon the graves of the soldier dead. It is the American way of paying tribute to the defenders of the Nation.

Friends, the Governor of the State of eight millions of people, one twelfth of all the people of United States, has given you his word of welcome and good cheer. He has asked the former Governor to tell you something of the history of the State. You are still the guests of Pennsylvania and you will be until, after visiting Pittsburgh, you have returned to Philadelphia.

Your custom is to respond to these addresses of welcome. You are the representatives of more than thirty nations of Europe, Asia and Africa, North and South America, a great body of distinguished men and women, who have come to pay compliment to America. It is your custom to respond to addresses of this character and in your behalf you have selected the Acting President of the Twelfth International Navigation Congress to say a few words.

Permit me to introduce to Americans present and to recall to those of you who are visitors the Acting President of the International Association of Navigation Congresses, the Engineer of Civil Works in Russia, Professor de Timonoff. (*Applause.*)

Professor de Timonoff (in English) :

Mr. Chairman, Your Excellency, ladies and gentlemen,

After a very successful session in Philadelphia, the members of the International Association of Navigation have enjoyed a most interesting excursion over the State of Pennsylvania, the Keystone State of the Union. The arrangements made for this trip, in very perfect manner, by the Local Organizing Commission make possible the gathering in a short time of valuable information which will be of great value to the members of our Association when they go back to their respective countries. The excellent book about Pennsylvania and its manifold activities prepared by the Organizing Commission, and more especially by Mr. Guy C. Whidden and Wilfred H. Schoff for the XIIth International Congress of Navigation upholds before us a magnificent picture of the historical growth and actual situation of natural resources and industries of Pennsylvania. But the reality has superseded our expectations as to the important place which the Commonwealth of Pennsylvania holds now in the complete union of states and more particularly as to the proposed developements of its waterways.

As Acting President of the International Permanent Association of Congresses of Navigation, I congratulate you Mr. Governor, most heartily on the success the State of Pennsylvania has already attained in this respect in the past and on the success that I am sure this State will attain in the near future.

At the same time, let me, Mr. Governor, confess to you and to the people of Pennsylvania whom you represent and to the people of Harrisburg, the deeply felt thanks of all the members of the International Permanent

Association of the Congresses of Navigation, who are assembled here to-day, and who enjoy the hospitality which was so cordially extended to them by your Excellency in this magnificent Capitol. (*Loud Applause.*)

Hon. J. Hampton Moore (in English) :

With thirty nations represented and all desiring to respond, it is manifestly impossible that we shall hear many representatives when but half an hour remains before we must leave this Hall. But some gentlemen have been suggested who ought to speak in response to the Governor's welcome. The Congress has three official languages; German, French and English. One of the regrets of this Congress is that those of us who are residents of the United States are not able to grasp fully the achievements of all the men who are assembled here, but here and there we are able to learn of their accomplishments. I propose to present a representative of France, a constructor of bridges and roads, interested in commerce and navigation in all the colonies of that beautiful country, Mr. Henri Xavier Boutteville.

Mr. Henry Xavier Boutteville (in French) :

Mr. Governor, Ladies and Gentlemen,

After admiring the great and wealthy city of Philadelphia, and its port gifted with such magnificent natural advantages, so well adapted for the export of the natural and manufactured products of Pennsylvania, we have the great honor of being received by your Excellency, in the capital of this great State. This morning we were enabled to appreciate the charm of this beautiful city, of its poetic river which reminds us of the fascinating works of Fenimore Cooper, and which on aesthetic grounds fully justifies the reputation it has hitherto borne in our minds.

The delegates sent by the French Government to the XIIth Congress have to-day, your Excellency, the agreeable task of thanking both you and the state of Pennsylvania for the sumptuous and cordial manner in which they have been welcomed in this beautiful country, and also for the exceptional facilities which have been granted to them for visiting and studying the great works and marvels of the industrial enterprises of Pennsylvania which have carried the fame of its wealth and splendour to the far ends of the earth.

The information we have gathered in Pennsylvania will not be lost, but will be of service to us in France. As regards myself, who have charge of important public works in the French Colonies, I shall always bear this important example in mind, and I can only hope that the economic development of the French Colonial Empire may follow however humbly, on the lines which we have been privileged to witness in this fine country, in the method of utilizing its magnificent natural wealth. (*Loud applause.*)

The Hon. **J. Hampton Moore** (in English) :

The largest delegation to the XIIth International Navigation Congress comes from that great empire where commerce has been developed so rapidly in recent years and whose works of construction are so noted throughout the world. Upon the platform here with us to-day is seated the Royal Prussian Ministerial Director of Commerce and Industry of the German Empire, Herr Franz Lusensky.

Mr. Lusensky (in German) :

Your Excellency, Ladies and Gentlemen,

Eight days have elapsed since the opening of the XIIth International Congress of Navigation at Philadelphia. What have we not seen or missed in the short space of one week? For most of us the activity we have had to display during the discussions of the Congress has not been excessive. We have found time to inspect navigation plant and works and of judging how great has been the progress accomplished in this domain by the United States and particularly by the State of Pennsylvania and we have been able to estimate the future progress and improvement which are anticipated. It is with the greatest interest that we have become acquainted with the important cities of Philadelphia and Harrisburg—Philadelphia one of the most important commercial capitals with its enormous traffic, and Harrisburg this beautiful city built on such a superb site which recalls to us Germans, similar scenery in our own country. We have furthermore had an opportunity of admiring the commercial and industrial development of Pennsylvania and we have seen naval yards with an extraordinary capacity of output and locomotive works of world-wide renown, whilst we hope to become further acquainted with American activity when we visit the great workshops of the world at Pittsburgh. Besides these educational trips we have found time for pleasurable excursions of varied character. If we have been able to utilize the short space of time at our disposal so successfully since we arrived on the new continent, it is thanks to the excellent timetable arranged by the Congress Commission. But our thanks are due still more for the friendship, cordiality, and hospitality which have been vouchsafed to us in all directions.

(Continuing in English) :

Ladies and Gentlemen,

On one of our first trips in your beautiful country we were addressed by a gentleman, who at the end of his speech told us, "make yourselves happy".

I think, that we cannot express our gratitude better than by adopting these words, by enjoying all the entertainments and pleasures you offer us so largely in the same cordial way they are offered, and by making ourselves happy. Let me conclude with the assurance that the beautiful days in Pennsylvania never will be forgotten by anyone who assisted at them. (*Loud applause.*)

Hon. J. Hampton Moore (in English) :

Just one more brief address and then we shall make an announcement before you leave the hall. You have heard the three official languages. French, German and English. The home of the Permanent International Association of Navigation Congresses is in another country, in little Belgium, composed of an active, progressive, earnest people. The President of the Belgian delegation, which is one of the largest assembled here, is the Inspector General of Bridges and Roads of the Administrative Department of that Country. I have pleasure in presenting to you M. Vanderlinden, of Belgium.

Mr. Vanderlinden (in French) :

Mr. President, Ladies and Gentlemen,

When I had the honor yesterday of being received by his Excellency President Taft, I told him that little Belgium was represented at the Congress of Philadelphia by a large number of members.

Here again in Harrisburg the Belgians are in great number, and for this reason amongst others, I consider it my duty to thank Governor Tener very specially for his cordial wishes and welcome.

I also most heartily thank the Commission which has organized this excursion for the intelligent way in which it has been handled, and also for the cordial and generous hospitality which has been vouchsafed to us in our only too brief stay in the city of Harrisburg.

We are gathered to-day on the occasion of the Navigation Congress, and I expect that several of you have asked yourselves "what is a Congress?"

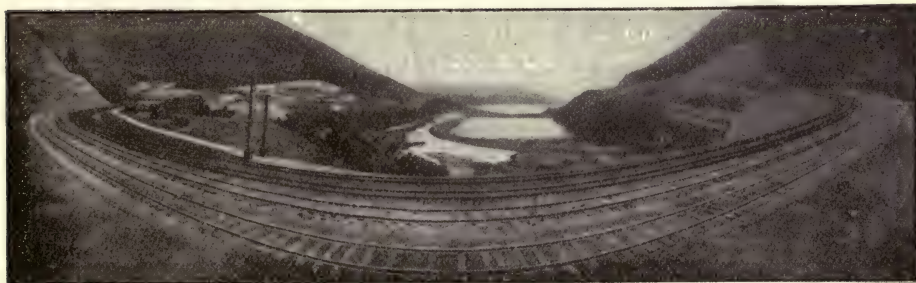
There are two things to consider in a Congress. What one sees and what one does not see. What one sees are a few meetings, some excursions, some work inspections, some speeches; for which one may well ask whether it is worth while bringing together a thousand members from all parts of the globe.

But by far the most important part is what one does not see; namely, the work, and the extensive investigations of the engineers of all nations during the years of interregnum between one Congress and another, and the remarkable reports which are drawn up by the greatest authorities on all navigation questions.

What counts unseen in Congresses are the friendly relations established between the members of these Congresses. From all parts, from 20 different countries in the world, men meet with the same object and animated by the same spirit, and they discuss together and frequently soon learn to care for and esteem one another. In this wise, most cordial relations are established between the members of the Congress, which have the most beneficial effects not only upon their own personal relations, but also upon those which exist between country and country.

More than once has a country solved an important problem by a meeting of this kind. This occurred quite recently in my own country in respect to the improvements of the Scheldt. And just now when I was walking along the fine banks of the Susquehanna I asked myself, whether in the event of the city of Harrisburg requiring to increase the efficiency of this fine river, the work of our Congress would not throw some light on the problem of improving this admirable river.

In conclusion, Ladies and Gentlemen, may I express the wish that the friendly relations created at Harrisburg between little Belgium and great America may long continue, to the mutual advantage of both countries.
(*Loud applause*).



« Horseshoe Curve », Pennsylvania Railroad,
between Harrisburg and Pittsburgh.

The meeting then terminated after this last speech, and the members of the Congress left the capitol for the executive mansion of the Governor, who had been graciously pleased to invite them to luncheon. They were received by Governor and Mrs. Tener and Miss Tener, and all did justice to the excellent repast which had been provided for them.

The members then returned to the Station, where they boarded the train en route for Pittsburgh, the hour of departure being fixed at 12.47 p. m. The train proceeded over the main line of the Penn-

sylvania Railroad through several ranges of the Appalachian system, crossing the high divide separating the Atlantic slope from the Mississippi Valley, the ascent to the summit (of which the famous horseshoe curve forms a part,) being much enjoyed. On the western slope many mining and manufacturing towns were passed, including Johnstown, the scene of the great flood disaster of May, 1889.

On arriving at East Liberty Station in the residential portion of Pittsburgh at 6.50 p. m. the party was met by the Pittsburgh Local Commission, and taken in special direct cars to the two hotels, namely the "Schenley" and the "Fort Pitt", where accommodation had been reserved for them.

Informal Dinner and Educational Meeting.

Later on in the evening the members of the Congress met again in the ball-room of the Hotel Schenley, where they were entertained to dinner, which was followed by an educational meeting. The walls of the room were covered with maps and plans exhibiting the Engineering subjects to be treated at the meeting.

After the dinner, which was excellently served, the Hon. James Francis Burke, member of the United States Congress, who presided, introduced His Honor William A. Magee, Mayor of Pittsburgh, who spoke as follows :

The Hon. **William A. Magee** (in English) :

Ladies and Gentlemen,

On behalf of the people of the city of Pittsburgh I take great pleasure in welcoming to this city the large number of distinguished Europeans who will honor us with their presence during the next few days.

It will be a great pleasure on the part of our citizens to make the stay of the members of the convention both profitable and pleasurable to them. We are aware of the eminence of our visitors in their respective professions; we thoroughly understand the purpose of their meeting; we have much to exhibit that will interest them and we have a situation here in the treatment of which we can learn much from their wisdom and the experience that they have gained in the solution of similar problems in their own lands.

There is no region throughout the United States which has more water problems to be solved than the so-called Pittsburgh Industrial District. We

intend to erect docks on the banks of our three rivers as freight terminals for water traffic; we must complete the canalization of the Allegheny and Ohio rivers in the interest of navigation; we must erect storage reservoirs at the headwaters of the Allegheny and Monongahela rivers for the prevention of floods; we have in contemplation a waterway connection between the Great Lakes and the Ohio river valley and we have with this the usual incidents of controlled stream flow, water power, reclamation and irrigation. I feel a great deal of pleasure in being given an opportunity of showing you—although very imperfectly—an outline of our conditions and situation. If you will turn your eyes to this map and observe the position of Pittsburgh you will see at once the superior strategic location of our city from a commercial viewpoint. Situate at the confluence of two great rivers where they form a still greater one our city has a tributary territory thousands of miles in extent, extending over parts of five great states, Pennsylvania, New-York, Maryland, West-Virginia and Ohio.

Besides being large in its extent it is one of the richest provinces in the world in its natural resources and its created wealth. It is not my purpose to burden you with statistics.

You can gather those from the published reports of the studies and investigations made during the last few years of each of our problems. But I cannot refrain from reminding you of what you all probably know, that here is the greatest railroad traffic centre of the world, having a tonnage amounting in 1910 to 167,000,000 tons of freight, a greater tonnage than that of the five largest seaports of the world combined.

In order that you may have a preliminary understanding of our aims let me ask you to follow me as I point out the course of the Monongahela river rising in Maryland and West-Virginia and flowing thence into Pennsylvania to its meeting with the Allegheny at Pittsburgh, and then the headwaters of the Allegheny in the Northern part of Pennsylvania and the southern part of New-York and flowing thence south through the state of Pennsylvania to aid in the formation of the Ohio.

Then follow the Ohio through the State of Pennsylvania and thence southwestwardly between the great states of Ohio, Indiana and Illinois on the north and West-Virginia, Kentucky and Tennessee on the south to the Mississippi.

The Monongahela river has been locked and dammed throughout its entire length to a depth of nine, seven and five feet. The Allegheny river improvements of the same nature have been completed for a distance of eighteen miles. The Ohio is largely completed and under a program outlined by the Rivers and Harbors Committee of the National House of Representatives will be completely canalized from Pittsburgh to Cairo within ten years. If you will follow me on the map again from the Port of Ashtabula on Lake Erie to the mouth of the Beaver river, thirty miles below Pittsburgh in Pennsylvania, and imagine a waterway connection between those two points you will be struck with a great surprise. Observe that there are two interior, main, natural waterways

on the North American continent, the one composed of the Great Lakes, forming the boundary between Canada and the United States, and the other the Mississippi Valley with all its tributaries. The shortest distance between the two is a straight line drawn between the two points I have mentioned. That line is 103 miles long, half in the State of Ohio and half in the State of Pennsylvania. More than half of it is now a natural water course, known in the upper part as the Mahoning river and in the lower part as the Beaver river. On this map you can let your eye travel from Duluth in Minnesota to the Gulf of St. Lawrence by way of the St. Lawrence river and to the port of New-York by way of the Erie canal, which is being enlarged to a depth of 12 feet and which will be completed by the year 1915.

Your eye can travel from Pittsburgh to the Pacific Ocean by way of the Ohio and Mississippi rivers, the Gulf of Mexico and the Panama canal. By way of other tributaries to the Mississippi you can reach twenty-five states, and all of the great interior cities of the United States with one or two exceptions. The commercial and transportation potentiality of Pittsburgh, therefore, is beyond measurement if, in addition to all of the waterway improvements now in process of construction, an additional one should be added of canalizing the Beaver and Mahoning rivers and digging an artificial channel between Beaver and Ashtabula. Its cost would be not exceeding sixty million dollars. Through it would be conveyed at low cost the raw materials which constitute the basic product of this district. The iron ore of Lake Superior would travel through it southward to Pittsburgh and the enormous coal output be taken northward from Pittsburgh. Add to this the great interstate and international commerce from all of the ports on the Great Lakes, the St. Lawrence and the Atlantic coast and the entire Mississippi Valley, and more would be accomplished in the settlement of railroad rates than all the laws that could be enacted by all the legislative bodies throughout the country, by the creation of a competitive interest as a rival to the railroads.

In addition to the improvements relating to the navigability of our rivers and the construction of this artificial waterway, we have still another problem of the utmost importance to which we must bend our energies. The uncontrolled stream flow in all of our rivers causes a loss of millions of dollars annually. Three years of the most thorough and painstaking study has discovered a remedy for flood damage. A number of public-spirited citizens of Pittsburgh have organized themselves into a body called the Pittsburgh Flood Commission. By voluntary subscriptions it assumed the task of studying and investigating the causes of floods. Mr. Knowles will tell you something of the work that has been done. It will suffice for me to say that two primary conclusions have been reached. One is the necessity for the erection of a river wall around the business district of Pittsburgh and the other the construction of seventeen reservoirs erected at various places on the two watersheds. The burden of constructing this river wall is upon the city of Pittsburgh and it will be made a part of the docks

which we intend to erect. The cost of the reservoirs is estimated at about twenty million dollars, and here arises our chiefest difficulty, a difficulty that exists in exactly the same manner with relation to the Lake Erie Canal. If all of the region that is roughly known as the Pittsburgh Industrial District was within one single commonwealth, I believe that there would be little if any delay in financing these two improvements. But, as I said before, the territory affected stretches out over the boundaries of Pennsylvania into all the adjoining states and furthermore, the administration and supervision of navigable rivers lies with the Federal Government. Most water improvements in this country have been made by the National Government. Some have been made by the states and a few by countries and cities. Still fewer have been effected by a combination of resources between these various governmental jurisdictions. It is hard, therefore, since we have no rule on the subject and since the benefits cannot readily be apportioned, to distribute the cost of construction.

Our next step is to devise plan of cooperative financing that will be so fair as to readily attract the voluntary action of all the principal beneficiaries of the improvements designed.

We can learn much from our friends from abroad upon the planning, financing and administering of such great public works as are in contemplation here, and for such advice we will be truly grateful. (*Applause*).

Mr. Paul Didier then gave a translation in French of the Mayor's remarks. He was followed by Lieut-Col. H. C. Newcomer, Corps of Engineers, U. S. A. in charge of the Government Improvement works in the Pittsburgh district, who spoke as follows :

Lieut. Col. **H. C. Newcomer** (in English) :

Ladies and Gentlemen,

In the few minutes at my disposal I shall describe very briefly the works of river and harbor improvement in the Pittsburgh district, and then illustrate with lantern slides some of the features of the movable dams that you will see on the boat trip tomorrow.

Monongahela River. — The drainage area of this river is about 7,340 square miles. The river is formed by the junction of the West Fork and Tygart's Valley rivers about 2 miles south of Fairmont, W. Va., and has a length of about 128 miles with an average slope of about 1.2 ft. per mile. The minimum discharge is about 200 cu. ft. per second, and the maximum about 200,000 cu. ft. per second. The entire river is slackwatered by 15 locks and dams. Seven of these were originally built by the Monongahela Navigation Company under a State charter, but these were purchased by the United States in 1897 and some of them have been rebuilt since that time. Locks 1 to 5, inclusive, are double, each having

2 chambers. The standard dimensions for the new locks are 56' x 360', this size being sufficient to pass at one lockage the usual tow handled by the steamers on this river carrying from 2,000 to 3,000 tons of coal. None of the dams are movable but Nos. 2, 3, and 5 have movable tops which may be raised 3 ft. above the crest of the dam. The total expenditures made by the Government to June 30, 1911, for purchase and construction of these locks and dams were \$ 7,725,904.59; the total expenditures for operating and care prior to the same date amounted to \$ 3,425,866.50, thus giving a total spent on the river by the Government at that time amounting to \$ 11,151,771.09.

The river traffic in 1910 amounted to 10,927,430 short tons, and 47,089 passengers. The greatest number of lockages at any dam was at No. 4, where they amounted to 16,208, or an average for the year of nearly one every half hour.

Youghiogeny River. — This river is a tributary of the Monongahela, entering it about 16 miles from its mouth, and is unimproved except insofar as it is affected by slackwater in the Monongahela. There is a project for improving the river about 19 1/2 miles from the mouth by the construction of three locks and dams at an estimated cost of \$1,050,000.00.

Allegheny River. — This river has a drainage area of about 11,580 square miles. A length of about 214 miles between the mouth and the New-York State Line has been under partial improvement. The average slope in this distance is about 2.2 ft. per mile. The minimum discharge at the mouth is about 1,200 cu. ft. per second, and the maximum about 240,000 cu. ft. per second. The slackwater improvement extends about 24 miles from the mouth and is provided by three locks and dams. Dam No. 1 is movable, while the other two are fixed. Lock No. 1 is 55' x 286' and Nos. 2 and 3 are 56' x 289'.

The open channel improvement above the limits of slackwater has been confined mainly to the removal of snags and boulders and similar channel obstructions and the construction of a few dikes or dams closing secondary channels.

The total expenditures on this river to June 30, 1911, amounted to \$2,277,055.97. The traffic in 1910 amounted to 2,235,015 short tons, and 26,793 passengers. There is now under consideration an extension of the slackwater improvement for a distance of 36 miles by the construction of five additional locks and dams at an estimated cost of \$2,788,000.00.

Ohio River. — This river is formed by the junction of the Allegheny and Monongahela rivers at Pittsburgh and has a length of 967 miles, flowing into the Mississippi River at Cairo, Illinois. The entire drainage area is about 210,000 square miles of which 18,920 are above Pittsburgh. The average slope of the river is about 44 ft. per mile. The project for canalization of the Ohio River to provide a depth of 9 ft. includes the construction of 54 locks and dams at a total cost of about \$74,000,000.00. These dams are all movable and usually have lifts of 7 or 8 ft. The locks are 110' x 600'. The navigable passes vary from 600' to 900' in length, and the rest of the dam

usually consists of 2 bear traps of about 91 ft. each and a Chanoine weir of variable length, depending on the width of the river. In some cases where the river is quite wide a fixed weir is also used. Aside from the bear traps the movable portion of the dam consists of Chanoine wickets. These are usually 3' 9" wide and 16 1/2 ft. long in navigable pass and 12 ft. long in the weir. In several dams the wickets are about 18 ft. long. Dams 1, 2, 3, 4, 5, 6, 8, 11, 13, 18, 26, 37, and 41 have been completed and are in operation. Dams 7, 9, 12, 14, 15, 19, 20, 29, and 48 are under contract and in process of construction. The project provides for the completion of all dams by 1922. The Pittsburgh district is in charge of Dams 1 to 10, inclusive. The total expenditures on the Ohio river in the Pittsburgh district prior to June 30, 1911, amounted to \$8,806,107.48.

The commerce at Dam No. 1 varies from about 3,000,000 to 4,000,000 tons a year, while the entire commerce of the river aggregates about 11,000,000 tons a year.

Pittsburgh Harbor. — This includes portions of the three rivers at Pittsburgh, aggregating a total length of 27.2 miles. The principal part, however, known as the lower harbor, is that portion lying between the dams numbered 1 in each river. This has a length of 8 miles. The total expenditures on the harbor to June 30, 1911, amounted to \$158,312.39. The commerce of the harbor in 1910 amounted to 12,314,664 tons and 683,172 passengers.

The speaker then exhibited and explained 20 lantern slides showing locks and dams built on the Ohio and Allegheny rivers.

Mr. **John E. Shaw**, then described the canal which is to connect Lake Erie with the Ohio, and join the two great systems of navigable waterways (the great Lakes and the basin of the Mississippi) of the United States. Mayor Magee had already alluded in his address of welcome to this new navigable waterway, which is destined to be of great value to commerce, and of exceptional interest to the three States of Ohio, Western Virginia, and Pennsylvania. Mr. Shaw dwelt at length on the subject of this navigable waterway, its method of construction, its dimensions, (a navigable depth of 13 feet with locks with 360 feet of available length, and 56 feet of available width,) on its water supply, cost of building, probable tonnage and on the advantages which will accrue from its construction. (1).

(1) Mr. Shaw's paper having already been published and distributed to the members of the Congress we do not think it necessary to give his remarks in detail here.

The work of the Pittsburgh Flood Commission was then described as follows by Mr. Morris Knowles, a Member of the Engineering Committee of that Commission.

Mr. **Morris Knowles** (in English) :

Mr. Mayor, Members of the XII International Congress of Navigation, Honored Guests and Ladies,

A. Introduction. — The Pittsburgh Flood Commission is particularly gratified at this opportunity to exhibit its studies and present its findings. We believe we are at last really coming to our own and that in speaking to our distinguished guests from other countries we are relating that which is fully understood and practised there for many years. We know you have been carrying out these ideas and are indeed glad to give praise for the many excellent examples of actual work constructed, which we have been able to study in the reports published by these nations. We welcome the opportunity to give this credit and to educate also those of our own countrymen who are still sceptical.

By a peculiar interpretation of our constitution; no matter what the excellent purpose and most cogent reason, no national money can be expended upon rivers, unless it be to improve navigation, and, in all but one recent case, it has been held; this must be spent upon the navigable portions of the rivers. We all know that the great expenditures for the protection of lands from overflow by the Mississippi have really been a flood protection measure, and yet has been under the guise of sole effect upon navigation; which of course it was in part. But there has been no unseemly desire to charge a portion of this cost in ratio to the other benefits derived; — by absence of floods, by improved agricultural conditions, etc.; as there is now so urgently emphasized (as a sort of last resort to discredit) in the case of reservoirs proposed for the same broad purpose.

The recent large expenditures for relief of flood suffering cannot of course be charged to navigation; unless it be to preserve the adjacent population which will require traffic in the future. (That is not so ludicrous, is apparent; when we realize that for some time there has been no packet service running south from St. Louis, on the great "Father of the Waters" toward New Orleans). Such recent expenditures are under the broad police powers, so called; to protect public health and act in times of emergency like famine and pestilence. This, however, may be doubted; whether it is not wiser to spend millions in *prevention* rather than millions in false *protection* and then more millions in *sustenance*.

We are, therefore, much gratified at the action of the Congress, as an expression of the opinion of thinking and learned men on these questions, all over the world, when they do not relegate reservoirs entirely to obscurity; but give them a place, among several others, as aids to the improve-

ment and regulation of the flow of navigable rivers. The resolution as adopted last Saturday, May 25th, 1912, is as follows :

" Absence of any exclusive method. "

" The navigability of rivers having but one current can be improved, as has been stated many times at the Navigation Congresses, by various methods, such as : Regulation of the bed by permanent works ; regulation of the bed by mechanical dredging ; *increase of depth by additional water supply furnished by storage reservoirs* ; canalization of the bed ; combined action of two or more of the above processes ; construction of a lateral canal. The use of one of these methods rather than another, depends upon the special circumstances of each particular case. Among these circumstances, the following are of prime importance : The nature of the river and its navigation ; the existence of objects of improvement other than that of navigability ; (more especially agricultural, power or sanitary purposes, protection of the banks in the interest of towns, protection against inundations), the degree of navigability required ; the importance of expected traffic, the resulting cost of transportation, including interest on the cost of improvement, maintenance charges and the cost of carriage ; money and time available to insure, for the boating industry of the line in question, the conditions of navigability, sought, etc."

B. — *The District and Rivers.* (1) — We first show you the relief map, No. a ; in order that you may understand the rugged topography in the vicinity of our city and the narrow confines of the rivers. You will of course appreciate this all the more when you take the boat trip to-morrow. It will be noticed that except in a few cases, and these are neither very wide nor extensive, the rivers are hemmed in by the abrupt hills coming close to the water's edge.

No. 1, giving a view of the "Point" and taken from Duquesne Heights above the city, shows this in even a more picturesque way. The " Point " is at the confluence of the Allegheny and Monongahela Rivers, forming the Ohio.

C. — *Causes of Floods.* — The causes of floods may be divided into two classes ; — *Natural* and *Artificial*.

Of the first, a heavy and concentrated precipitation is the principal factor ;—while the second may again be divided ; one, the extensive denudation of the mountain slopes, giving a greater rate of run-off, and the other, the encroachments of man upon the channel of the stream, by filling, narrowing, obstructions, all producing a higher stage for a given discharge.

(1) Mr. Knowles' address was accompanied by several slides showing diagram of studies and proposed sites ; reference is made to these by numbers, none are reproduced herewith.

Nos. 2 & 3, show how the forests have been destroyed and left in a most unsatisfactory state, either to conserve the timber, or the water. They represent typical scenes in Western Pennsylvania, after severe lumbering and logging and destructive fires; which so frequently follow in the wake of such careless work.

Nos. 4 & 5 show denuded and waste areas where, added to the fact that forests have been cut, the fumes from coke ovens and industrial establishments, and caving of surface by undermine workings have served to prevent any vegetation getting a growth again.

Such examples make for quick run-off, no retention is possible. The records show that floods on these streams are increasing in frequency and height. Furthermore, with the right combination of events, it will be possible some day to have a forty-foot flood, at Pittsburgh. Danger stage is 22 feet and the highest record in 1907 was 35.5 feet.

Nos. 6 & 7 present a few typical examples of man's encroachment upon the carrying capacity of the streams. The first shows the right or north bank of the Allegheny River, where, at one time, the water spread out and flowed freely at times of high stage, but now the area is occupied by railroads and industries; thus restricting the discharge. The second shows how bridge piers, with unnecessary extensions, which taper to great width about the base, throttle the flow. Everyone has seen the water pile up in front of such obstructions. How much worse is it when the piers of adjacent bridges are staggered instead of on line, as frequently occurs!

D. Possibilities of Improvement. — No. 8 shows a virgin spruce forest, with a few hard woods, such as may still be found in a few places on the head-waters of the Cheat-River in West Virginia. Who is bold enough to say that with such conditions we would not have a less rapid run-off after a heavy rain and thus a more equitable distribution of flow! The Flood Commission believe thoroughly in the efficacy of such conservation of nature's resources; but they agree that the process may be slow and therefore pray for some more speeding doings, while lending a helping hand to such good effort.

Nos. 9, 10 & 11 exhibit methods to prevent wash and erosion with which our distinguished guests are no doubt familiar; for these views are typical of many works abroad. The first two show the "Barrages" or barriers to rapid flow, causing erosion. The last shows a plan, with the position of many of these "barrages." We have no doubt that opportunities exist in many places for doing similar work upon the Allegheny and Monongahela Basins, thus serving to alleviate the fears, so common with some hyper-critical minds, that reservoirs, even if found, would soon silt up and become useless.

E. What Floods Do. — Time does not permit that I should tell you of the vast damage caused by floods, to business, to industry, to traffic, to homes, to the service of water supply and light. The great flood of 1907, covered 1,600 acres, over one-half of the lower portion of the city; affected \$160,000,000 of real estate; and with two others during the same twelve

months, caused a direct monetary loss of \$6,500,000. Pittsburgh has thus suffered \$17,000,000 in 20 years and the Ohio Valley \$100,000,000 in the two floods of 1907.

Nos. 12 & 13 show the effect of the flood of March 15, 1907; the first looking down stream toward the Ninth Street Bridge and the latter a view of Penn Avenue looking east from Fifth Street.

While the most spectacular effects are those from floods, the complementary stages of low water at other seasons of the year have their effects; nevertheless important, even if not so commonly realized. The concentrated acid or alkali condition and increase of filth effect are most noticeable.

Nos. 14 & 15 show the work of the acid contents of the Monongahela River upon metallic structures, like lock gates, the effect on steel bottoms from boilers is equally severe.

F. Possible Reservoir Sites. — Those of you who have listened to the arguments and read the numerous treatises on this very live subject have heard repeated over and over again;—"Well, even if dams were safe,—even though the reservoirs may not silt up,—even in many other things;—you cannot find sites upon the Allegheny and Monongahela Basins to build reservoirs."

Now, we propose to show you that this is not so, because we have the goods to prove it. This is the first time one has been permitted to say he bases his conclusions upon actual surveys and studies of definite sites. But no central and paternal government has helped us; the citizenship had to dig it up for themselves. We had to do herewith our own money a job that, as an example for other situations, the United States Government should have done scores of years ago. For over sixty years this question has been agitated in this country, and for this particular section. All discussion, sometimes somewhat acrimonious, has been purely academic, without any field data whatever. Now, we have accurate and painstaking surveys and studies, have spent four years time and expended \$125,000 of our own money to find out the truth. Whenever this question has come to the front, it has always been defeated by those who influence the expenditure of national monies, by the academic argument that it is no use. "Sites do not exist." It is unfortunate that any opinioned class has succeeded in preventing the light of free and fair investigation to shine upon the solution of any problem. For by this prolonged procrastination, where there are now only 43 sites there were double that formerly not occupied by railroads and towns. We know that railroads, while previously locating along stream valleys; now seldom do and cut straight through the country on slight grades; still now that they are in the river valleys they are costly barriers, in many cases; to the building of reservoirs (1).

(1) A reference to eleven pictures followed, exhibiting proposed sites and explaining the character of the site and country.

As previously stated we have found 43 such sites for reservoirs, but, as will later appear, only 17 are thought to be really necessary to be built. The position of these 17 is shown up *No.* 28. It will be seen by the cross-hatched area that they control a large part of the drainage area, really 8,000 square miles, or 54 percent. The combined capacity will be 60 billion cubic feet and the estimated cost is \$22,000,000.

G. Tabulated Data. — Without tiring you with the details of estimates we will show up *No.* 29, Clarion *No.* 1 an example of the information presented for each project. This is for one of the largest reservoirs and all estimates are in similar detail.

Nos. 30 & 31 present the summary of this information for the Allegheny and Monongahela drainage area, and *No.* 32, the completely summarized table for all 43 projects.

No. 33 presents this total cost data for each project, with the flood control capacities.

No. 34 shows the cost of various wall projects about Pittsburgh. The Flood Commission has determined that protection by a high wall, is out of the question; as well as the fact that such attempt at solution would be local and not obtain; but rather complicate, if not prevent, the obtaining of correlated benefits to a reservoir scheme. It is, however, thought that a low wall along certain stretches of the Allegheny River will accomplish the two-fold purpose of affording protection in several low lying places and provide a suitable quay wall for shipping and docking facilities. The total net cost of various combinations of projects for reliefs is shown on *No.* 35.

H. Effect of Reservoirs. — By far the most fascinating part of the whole subject is to study the effect of the holding back of the flood waters of various tributaries upon the peak of the flood at Pittsburgh. Some assumptions of course have to be made, more for earlier floods than later ones. There were in reference to the exact time of beginning and ending of rainfall, the variation in intensity, velocity of flow over land, in small and in main streams. These were made from observing the relation of other factors and the best data at hand.

That they were not far out is best evidenced by the analysis of the recent flood of March 22, 1912. It is thus gratifying to note that this would have been controlled just as the predictions of assumptions had indicated. For this last one we had the benefit of many accurate rainfall and stream flow stations that were not before in existence.

The times of the movement of floods in the Allegheny and Monongahela Rivers is shown upon *No.* 37 and is plotted from existing data as to times of travel to Pittsburgh.

Nos. 38 & 39 show the peak of the flood at Pittsburgh March 15, 1907, and the respective flood peaks of the different tributaries; plotted to twice normal scale, and moved to come as to time when the respective peaks would arrive at Pittsburgh. The first shows the effect of all 43 projects and the latter using 17 projects, only. Note the slight difference.

This flood would have been 6.8 feet above danger line or 22 feet, instead of 13.5, with 17 reservoirs used. All other floods would have been below danger. The average reduction being 10 feet.

I. *Relative Effect.* — Of even equal interest, however, is the method of determining why 17 are about as effective as 43 reservoirs. This is due to the fact that because of existing conditions as to topography, denudation, distribution of rainfall, etc., certain tributaries are repeated offenders. The problem is then to determine the relative value of each reservoir in reducing the flood height at Pittsburgh. This is done by obtaining the percentage reduction due to each reservoir upon each flood, and these are all plotted and shown on No. 40.

A reservoir may, however, cost more than it is worth in performing such effect in reducing flood peaks. So we have next to determine the relative value of effectiveness, i. e., the cost per cent of effectiveness. This is plotted and shown on No. 41.

J. *Result at Pittsburgh.* — The reduction of flood heights has been explained, but of even greater importance to this Congress is the effect upon the low water discharge. This is shown upon Nos. 42 & 43.

No. 44 shows profiles of river beds, dredging and flood grades and reduction of 1907 flood by use of reservoirs and dredging.

We are now told that no matter how effective for flood control, as such reservoirs are of little or no use to navigation, thus no public monies can be expended for them. It is unfortunate that resistance to the expenditure of national funds has been so persistent, even in the face of European successes. It may be well enough to state here that we have never claimed that a nine foot stage can thus be maintained upon the Ohio River by reservoirs alone; for we know the average yearly flow will not always equal this. But this is not equivalent to saying there is not benefit to navigation to be obtained from such storage.

Why! we know that at times there is not enough water in the Monongahela River to afford sufficient lockage water at some pools for the traffic. How much more will this be so when it increases, as is certain with the Ohio canalization and the Ohio River & Lake Erie Ship Canal, of which you have heard this evening. It is quite probable that the same thing will be true in the Ohio where traffic is at a maximum. Why mince words as to whether such reservoirs will aid in increasing the low water flow. Increase does not mean a nine foot stage, all from this cause with nothing else done; but it does mean furnishing sufficient water for the nine foot stage.

Our data show that the Allegheny low flow can be increased for the whole dry season 3.5 times and the Monongahela 6.0 times the present minimum, by building the 17 reservoirs and having them half full at the beginning of the dry season. The Ohio at Wheeling, sixty miles below Pittsburgh, can have its flow increased 3.0 times, and the depth of water 2.3 feet. Is this not worth while?

No. 45 shows the increase in heights and discharge at certain important points by the use of reservoirs.

No. 46 shows a correlated benefit, that of reducing the hardness of the Allegheny River during the low water, by increasing the volume by flow let-out from reservoirs.

K. Samples of Data. — After such exhibition of thoroughness in our studies it has pained us to learn that, even now, criticisms are directed to the supposed inaccuracies of the data and plentitude of assumption without authority; and the like.

To show examples of the kind of information secured, data from 84 rainfall stations were obtained. These stations are shown on *No. 47* together with lines of equal mean annual rainfall. Such distribution was plotted and studied for each flood storm. *No. 48* shows the 31 gauging stations from which data were obtained in regard to the height, extent and duration of each flood, and in fact all flows while in existence.

No. 49 shows the discharge curve for the Allegheny River at Kittanning. Similar ones exist for each gauging station.

L. Examples of Similar Works. — It has remained for recent discussion to afford the most absurd criticism of all to such important works. It is this; that such dams cannot be built secure, with safety and free from danger of a breach. To agree with such would argue ourselves unfamiliar with some of the world's most famous works. Our honored guests from foreign shores know that such works have been built for years. We show you *Nos. 50, 51, 52, & 53* to recall a few of the notable examples abroad. The first, of the Furens dam in France, is the progenitor of all modern dams.

We must not forget even the most thorough, scientific and important works in this country done by our own engineers, Members of the American Society of Civil Engineers, upon the Boston and New York Water Supply Systems and the U. S. Government Reclamation Service in the West. Our foreign friends are surely familiar with *Nos. 54, 55, 56, 57, 58, 59, 60, 61, 62 and 63* even if some of the American critics are not.

After the completion of Mr. Knowles remarks, which were received with much applause, the meeting was declared at an end, and the members returned to their hotels.

On the following day, 31st May the members, who were quartered at the Hotel Schenley left at 9 o'clock in special street cars for the Union Railway Station. Those quartered at the Fort Pitt hotel walked to the station, which was close at hand. At 9.30 a.m. a special train was taken to visit the plant of the American Bridge Company at Ambridge, Pa: on the Ohio river, about 16 1/2 miles below Pittsburgh where the party arrived at 10 o'clock. The ladies of the party were taken by automobiles from Pittsburgh to Ambridge, returning with the gentlemen of the party. Here the visitors were

met by the officers of the Company, and fifty of the Company's engineers, who acted as guides, printed description and diagram of the plant having been furnished to each member on the train. The entire party was photographed before visiting the buildings and yard. The party then visited the main structural building, covering an area of 4 7/10 acres, the bending and forge shop, the bolt and rivet shop, the general machine shop and the eye bar shop, after which the members were taken to the barge yard on the bank of the Ohio river, where the construction of several steel barges was in progress. One of these just completed, was successfully launched during the visit.

The important American Bridge Company possesses fifteen bridge plants, of which Ambridge is the largest. It produces 240,000 tons of finished product annually, including structural steel for buildings and other purposes, as well as for bridges. About 3000 persons are employed, including more than 200 engineers and draughtsmen. Among the interesting pieces of work shown to the members at the plant was a truss for a bridge, to support one of the emergency dams for the Panama Canal. Other works of special interest were bridges for the Kentucky and Indiana Railroad at Louisville, Kentucky, and for the Norfolk and Western bridge over the Ohio river at Kenova, Western Virginia. Many of the members were particularly interested in the use that is made of the unoccupied bottom lands, which are divided into garden plots for the employees to cultivate vegetables for their own use. Annual prizes are given for the best results.

At noon the party again boarded the special train and went down the river as far as Legionville, where, under Lieut-Col : Newcomer's direction one of the bear-trap dams was lowered and raised. After this the train proceeded to Davis Island where a transfer was made to the steamer "Sunshine". Luncheon was served on embarking. The steamer proceeded up the Ohio and Allegheny rivers to Hern Island, where the lowermost of the dams constructed by the United States Government for the canalization of this river was shown. From the dam the steamer went down the Allegheny to the junction of the Allegheny and Monogahela rivers, thence up the latter as far as the Homestead works of the Carnegie Company. The various large manufacturing plants



Junction of Allegheny and Monongahela Rivers.

along the river had been indicated on the maps furnished to the members, and were consequently easily distinguished as the steamer passed along, since numbers corresponding to those shown on the maps were exhibited in large figures on the works. The return from Homestead to the hotel "Schenley" was made by special street cars, the party reaching the hotel at about 5.30 p. m.

Informal Dinner and Smoker at Hotel « Schenley »

The members had been invited to dinner at 6.30 p. m. This took place in the main dining room of the Hotel "Schenley," which had been handsomely decorated for the occasion. During dinner an orchestra played the national airs of most of the countries represented at the Congress, and at about 9 p. m. the smoker was opened with several selections of instrumental and vocal music. After this part of the programme was completed, speeches were made in which thanks were expressed to the local authorities for their magnificent reception. Those present were also asked by

Mr. John M. Goehring, President of the Council of the City of Pittsburgh, and Chairman of the Entertainment Committee of the Local Commission, to give their opinions briefly on the proposed improvement works for the navigable waterways around Pittsburgh,

Mr. John Goehring who presided, then remarked, (in English) :

The evening's entertainment is supposed to be of a social character and the committee on entertainment has thought best not to jeopardize the pleasures of the evening by a programme of set speeches. As you will recollect, our programme of last evening was of an educational character.

Some of our engineers and others of the vicinity outlined some of the improvements relating to the Pittsburgh district. Our distinguished guests have had an opportunity today to look over the ground connected with some of these improvements.

We think it would be quite interesting, in fact we know it would be interesting and instructive to the citizens of this community to get some expressions of opinion from our distinguished guests in short five minute addresses. We know that in the short period of a day or two you can get but a slight impression of the industries of Pittsburgh. Nevertheless, from your knowledge of this subject and from the slight information which you have obtained regarding our proposed improvements, we feel that whatever you may say upon this subject may be instructive. We feel that we would like to have the opportunity of seeing ourselves as others see us. And I have availed myself of the opportunity of calling upon general Bixby, President of the XIIth International Navigation Congress, representing the United States Government in this Congress, and of Mr. de Timonoff, acting President of the International Navigational Association, to assist me in calling upon the speakers who probably would like to express their opinion upon their visit.

Brigadier-General **W. H. Bixby**, Chief of Engineers U. S. Army (in English) :

Ladies and Gentlemen of Pittsburgh, and Members of the
International Navigation Congress,

To most of the former I am known more or less either by my past services on the Ohio River or by various notices, that appear from time to time in the newspaper as to Pittsburgh Rivers and Harbors which Pittsburgh likes to see going on favourably (*applause*) very naturally, very appropriately.

To the people of Pittsburgh I would say a word of explanation about this International Congress. It is a little difficult for Americans to under-

stand its organization. The Association of International Congresses is an organization that has existed for 20 years or more and has taken in nearly all the important countries of Europe and of America, both North and South America.

The association itself goes on forever and is increasing all the time in importance; and its discussions are becoming all the time more important, especially to every country that knows it well. Mr. de Timonoff will speak to you to-night as the Acting President of the International Association. I am held by virtue of my position as President of the XIIth Congress, that is to say the Congress of 1912, which has just been finished at Philadelphia. So far as the official discussions are concerned the Congress is ended, but the delegates are taking advantage of their visit to America to go around the country, so far as their time will permit, to look at the most important ports and rivers of the country within easy reach of their port of entry, New York. So far they have seen a good deal of Philadelphia and its immediate neighborhood including Washington and Harrisburg and Pittsburgh. On their return they will go back to Philadelphia and through New Jersey. Some of them will go to Boston; almost all of them will go to Albany; and almost all of them will go to the Great Lakes and up to Sault Ste-Marie. Quite a number will go through Canada back to New York. A great many will go to Milwaukee and Chicago to Keokuk for the big dam on the Mississippi and perhaps down the Mississippi to Memphis to see the effects of the flood. And some of them will go to the Western coast of the United States and see the great ports of the Pacific. After that, they will return to the East and sail again for Europe.

The next Congress cannot meet for three years, that is to say, there will not be another meeting like this until 1915, and the chances are that that will not be held in this part of the world, because it has been the custom for many years not to have two Congresses in succession in the same country; the rule being to so arrange matters that the Congress will go from one place to another and meet in as many different countries as possible at three year intervals.

The members are all, so far, delighted with their trip through Pennsylvania, to Pittsburgh, around Pittsburgh, and down the Ohio River where they have seen some conditions of river improvement that are very difficult to be understood by anybody who lives outside of this particular neighbourhood. And they will enjoy to-morrow as they have to-day and when they go away from here, I am sure, from everything I have heard, they will go feeling that they have been glad to have been invited to Pittsburgh, and glad that they have not omitted this section of the United States.

As the speeches to-night must be short I will stop mine right here, by presenting to you Mr. de Timonoff, who comes all the way from Russia, who is an Honorary Member of the French Society of Engineers and who has been for many years a Member of the American Society of Civil Engineers (so that he is already one half American), who has for many years been associated with this International Association of Navigation

Congresses, and who, by virtue of the absence of its presidents, now in Brussels, comes here as Acting President. I take great pleasure in presenting to you as the next speaker Mr. de Timonoff.

Mr. de Timonoff (in English) :

Ladies and Gentlemen,

I need not tell you that when the programme of the excursions of the XIIth International Congress of Navigation was made known to the members of this body, the name of the city of Pittsburgh which they found in this programme gave them the greatest satisfaction.

We Europeans know well that this name means the greatest human energy, foresight and knowledge, combined with the richest natural resources of the American country. This most prominent men have worked and are still working here to transform the gifts of the earth into instruments of progress and civilization in the largest sense of these words. They make rails and machinery of all kinds, but at the same time they create principles and ideas which prove and will prove always, very useful for the world at large.

Such men as Carnegie and others, being great workmen of Pittsburgh, are also contributors to the general progressive march of humanity.

The engineering problems concerning hydrography, floods, navigation, water power—present also in the Pittsburgh district great interest for the members of the XIIth International Congress of Navigation, because of the greatness of the problems themselves, and of the very instructive suggestions which the proposed solutions of these problems will undoubtedly give to the engineers of all the nations represented. You will hear more about these important questions from other members of our body who are to address you this night. For all the reasons I mentioned we consider it a great advantage to have been invited to visit Pittsburgh and its principal establishments, and to have been given such perfect information on the navigation of the Ohio River, on the projected Ohio-Erie canal, and on the prevention of floods. We shall never forget the impressions gathered here, and I am anxious to express our best thanks on behalf of the Permanent International Association of Navigation Congresses to the Mayor and Council of the City of Pittsburgh, and the Committees that have assisted.

Brigadier-General **William H. Bixby**, Chief of Engineers, U. S. Army (in English) :

This International Association takes in all the prominent nations of the world. We have 29 nations named on our list of delegates now here in Pittsburgh, 29 different countries, which shows you how widely the membership is scattered over the world, and Germany is one of the most prominent countries that takes part in these Navigation Congresses.

Germany alone has here in Pittsburgh on this trip 50 members (*applause.*) In calling on Germany first to respond and to tell the people of Pittsburgh something about Germany and what the Germans think of their visit here, I am not merely calling on Germany because it is most numerous, but because, following along the time honored practice of the International Association, the countries are always called upon in alphabetical order according to their French names as they appear in the list of the membership of the Association. Germany stands today first in alphabetical order, as well as being first at this gathering by its greatest membership. And in calling on Germany, I will call on Mr. W. Germelmann, member of the Superior Council of Public Works of Germany to address you a few words.

Mr. W. Germelmann (in English) :

Ladies and Gentlemen,

During our journey across the ocean we frequently discussed the large industrial works of America. Pittsburgh, we used to say, is called the "smoky city" by Americans.

But what have we seen, Ladies and Gentlemen? A large and wealthy city, rich in coal, rich in minerals, rich in beautiful scenery, rich in fine country houses and parks, but above all, rich in active and intelligent men, and last and best of all rich in its surrounding of charming ladies from Pittsburgh.

A reception has been prepared for us in this city, which far exceeds the wildest flights of our imagination. It is an absolute and agreeable duty to take this opportunity of thanking you, and of expressing our gratification. The citizens of Pittsburgh have allowed us to visit their works, and to enter into their thoughts and ideals. The recollection of this fine city of Pittsburgh, and of its charming inhabitants, will remain indelibly engraven on our minds. (*Applause.*)

But, Ladies and Gentlemen, allow me just to touch upon another point. We have been asked to give our views regarding the disposition of your navigable waterways.

As a German I defer most willingly to this desire, since this very question which attracts so much interest in Pittsburgh, was the subject of a very thorough investigation in Germany a few years ago. The question also arose there, whether the construction of new navigable waterways was justifiable, in view of the great extension which had taken place in railway construction, and the pros and cons of this question were discussed long and ardently. We concluded in favour of navigable waterways, after expressing the opinion that these, and the railways, should not compete with one another, but should be complementary so as to jointly contribute to the well-being and, by proper management, to the economic interests of the country.

We have constructed for about 500,000,000 marks of navigable waterways, and we shall certainly have to spend several more hundreds of millions of marks to complete our system of navigable waterways, so as to enable it to cope at all times with any eventual traffic.

Judging the question, therefore, from the German point of view, I can only express the wish that the great industries of Pittsburgh may, like the industries of our own country, soon be provided with large navigable waterways of great capacity, to connect them with Lake Erie and the Mississippi."

In view of the activity which is being displayed in this direction, I feel assured that my wish will be realized very soon, and I will ask you therefore, to join with me in wishing you, "full steam ahead." (*Loud applause.*)

Brigadier-General **Bixby** (in English) :

Another of the most important countries in the Association, as well as the next in alphabetical order is Austria. While Austria is not as large as the United States it in many ways exceeds United States in the care which it gives to rivers (like the Danube), and we have with us Dr. Hermann Matheusche, Director of Royal Docks of Austria, who will say a few words to you.

Dr. **Hermann Matheusche** (in English) :

Ladies and Gentlemen,

When we arrived in Pittsburgh, and when we came to the Schenley Hotel, we were shown the pictures of the 6th Centennial Celebration, held on November 25th, 1910, and some of its important works; and when to-day we had before our eyes the patriotic colours and emblems which inspired the heroic spirits of our ancestors, I asked myself, does Pittsburgh recognize this or does it not. I was quite sure it did.

And, looking through the pamphlets submitted to us, I saw on one of the pages in relation to the Pittsburgh Industrial Development Commission that Pittsburgh possesses the largest structural steel plant, the largest glass manufactory, and many other lines of work, in which it is the largest. So that Pittsburgh has realized the forecast, has realized the prediction, that had been made as to these important works.

And Pittsburgh has given us all possible occasion to persuade ourselves of the fact. We went this morning to the American Bridge Works, one of the finest works of this kind that we have ever seen. We saw there a lot of nuts, bolts, rivets, and all such materials being made safely, quickly, and in a quiet manner. All mechanical work that we saw, everything that is done there, is nicely done. It was an example to every one of us to do the same.

There we saw also the big work which is done for the Panama Canal; we saw the important emergency canal gate which is being constructed there. And I say that when a work like that is assigned to any factory, it is quite sure that the latter is a very good factory.

Even considering that you showed to us the best you have, I can say, in pursuance of my impressions and with the wish to congratulate you, that we hope you will go ahead and continue to do things with the same magnanimous hospitality we have found everywhere in your country. I think my best answer to the Chair will be to wish that you may go ahead in the future successfully, to wish your cities a great future growth, and great prosperity.

Brigadier-General **Bixby** (in English) :

Another country well upon the list which we will be glad to hear from is Belgium, and Belgium is also very numerous in its membership in the Society, the number of delegates from Belgium here today being 20, and the number at the Convention in Philadelphia many times greater. While Belgium is very small in area, it is very densely populated; its population being many times more per square mile than we can find in any county of Pennsylvania, and many times more per square mile than we can find anywhere in the United States. When it comes to the question, however, of waterways, or construction of canals, or of improvement of rivers, Belgium is one of the countries of Europe that knows all about such work; and if Mr. Franz Zanen, Engineer in Chief, Director of Bridges and Ways, coming from Antwerp, is in the room we wish to hear a few words from him.

The gentleman referred to did not respond.

Brigadier-General **Bixby** :

Well, ladies and gentlemen, I am sorry that you have missed a very interesting short address from Mr. Zanen. Something must have occurred unexpectedly to call him away.

But after Belgium comes France, and France is another country densely populated and full of rivers and canals, where we find almost everything in the way of river improvements that has ever been heard of except bear-trap dams; and that is the reason everybody wanted to see the bear-traps on the Ohio today to see how they were operated.

So I will ask that Henri Xavier Boutteville, Inspector Général, Bridges and waterways, of France, will come to the front and speak for France.

Mr. **Boutteville** (in French) :

Mr. President, Ladies and Gentlemen,

Certain cities of the East which the traditions and legends of centuries have enveloped with mysterious charm, exercise an attractive fascination on our imaginations. This is the case with Pittsburgh, whose fame has become world-wide in the few years comprised in one or two generations of active and strongwilled men, which possesses for engineers of all countries—and I am pleased to add also, for their wives—a very special attraction. We are consequently all looking forward to this technical pilgrimage to the Mecca of modern industry to the city of steel and coal.

The graciousness and foresight of the Organizing Commission of the XIIth Navigation Congress, of the Local Committees of Pittsburgh, and of the city of Pittsburgh itself, have enabled us to fulfil our wish under the most agreeable and comfortable conditions. I take this opportunity of expressing our most sincere and grateful thanks to those committees and the city of Pittsburgh, on behalf of the delegation which has been sent to this Congress by the French Government.

And how cleverly this excursion has been organized.

After the instructive visit to the great port of Pennsylvania, to Philadelphia, the "city of brotherly love," we have been enabled to admire the fine Federal Capital of the United States, and to present our respects to the eminent President Taft, and lay our humble tribute of admiration on the tomb of the Father of the American Fatherland. We have then had the honor of being received in the most cordial and gracious manner by the Governor of this great State, and by Mrs. Tener, to whom I tender my respectful homage.

The voyage from Harrisburg to Pittsburgh has been one round of wonders. The beautiful valleys of the Susquehanna, and of the Juniata, have reminded us of the magnificent sights of Europe, and we have been enabled to judge for ourselves that the fame of this glorious and smiling country, so often sung by the Poets, has not been exaggerated, and that the reality far exceeds its reputation. And whilst our eyes as artists were ravished by the beauty of the view, by these tall, green and wooded hills, and by these long rivers; our eyes as engineers were struck by the intensity of traffic on this great four track railway, which is so ably administered by the Pennsylvania Railroad Company. I will not conceal the fact that if such a suspicion could have entered our minds I would have thought, on seeing the long goods trains following one another at such short intervals, that the Company had concentrated the traffic of a whole month into one single day, in order to astonish us.

But this suspicion, even if it had occurred, would soon have vanished on approaching the great steel city which is the symbol throughout the world of the power and importance of American industry. And yet on disembarking, we found ourselves in a delightful city, replete with

luxurious residences. We have been welcomed in the most charming manner, and it is to me a very pleasing duty to render our thanks to the Ladies' Committee of Pittsburgh, which has surrounded the ladies taking part in the Congress with such care and attention.

Well, to-day we have come in contact with the industry of the Pittsburgh district. Nature has here, gentlemen, specially favoured you, for it has placed within your reach coal, petrol, naphthaline, gas, and a system of navigable waterways on which the Mayor of Pittsburgh was yesterday good enough to give us most interesting and elucidating information. The way in which you have known, how to take advantage of the natural wealth of the district, is a proof that you will know how to resolve, with the same success and masterful resource, the problem of the improvement and extension of your system of navigable waterways, which is now before you.

It would be a great triumph for the Navigation Congress of 1912, if the discussions which have taken place at that meeting had thrown any light upon these problems, and enabled you to find a solution commensurate with the great interests at stake; and at the same time satisfactory from the technical point of view.

I will conclude with this very sincere hope, and will ask the Ladies' Committee, the Local Organizing Committee, and the City of Pittsburgh, to accept our renewed thanks for their welcome and for their magnificent reception. (*Loud applause.*)

Brigadier-General **Bixby** (in English) :

It is very pleasant to all of you, I know, to hear from people of the various languages spoken in this association. For as we of the association know, but as the people of Pittsburgh perhaps may not know, the Association in its Congresses has three official languages and everybody is expected to speak in either French or German or good American. Now, on the part of the United States, I want to have you listen for a few moments to the President of the second section, the maritime navigation section, of the Congress, who presided at all the meetings of his section at Philadelphia, and who can tell the people of this neighborhood something more, than I have, about the Association, what it is, and what it can do. I take pleasure in introducing Mr. Elmer L. Corthell.

Mr. **Elmer L. Corthell** (in English) :

Mr. Chairman,

I am very glad of the opportunity to say a few words to you and your associates of Pittsburgh about my friends who have come here from many countries to attend the International Navigation Congress and to see something of this and other cities of the United States.

I know these friends well, and also those left behind in many countries unable to attend the Congress. Since 1891, when as Chairman of the committee to organize the International Engineering Congress held in Chicago in 1893, and through subsequent years connected closely with the Navigation Congresses, I have corresponded with engineers in all the countries of the world and have visited very many of them at their homes. I mention this in order that you may know that I have an intimate acquaintance with these friends of mine—strangers to you. I wish to state that one of the important results of these gatherings held in many countries and in intermediate years at Brussels, the home of the Congress, and also of the very extensive correspondence constantly going on between us, that there is a comradeship among us that is true and complete. Let me illustrate. In 1898 the Congress met at Brussels to organize permanently the Navigation Congresses—Maritime and Inland Navigation. There was a large reunion of all nations. Two of them were in the midst of a cruel war with each other—Spain and the United States. The Congress went to Antwerp on an excursion and was to make an examination of the Scheldt on a steamer. The remark was made that the delegates of these two countries would meet for the first time on that steamer and what would they do. The delegate of Spain was our dear old friend Churruca, who in the goodness of his heart had for many years sent us his annual reports of the important work under his charge at the harbor of Bilbao; the other was myself. Instead of avoiding each other, as had been expected, we rushed into each others arms in a true Spanish embrace, like brothers long separated, as we really were—brothers in professional work, labouring to do our duty for humanity, which in the brotherhood of engineers is far above and beyond all national lines of conduct.

This comradeship is one of our chiefest characteristics and it extends to every member of this Congress coming from every one of the forty countries represented here. This comradeship, this constant professional and friendly interchange of ideas on the important subjects of navigation; these yearly meetings at Brussels of the Permanent International Commission, where the leading navigation engineers of the world meet to attend to the business of the Navigation Congress; all this union of effort to advance the cause of navigation work in all the world, in which we are its apostles and interpreters, is doing as much for the peace and welfare of the world as any special organization or any efforts at International Arbitration. (*Loud applause.*)

Brigadier-General **Bixby** (in English) :

The next country we have on our list with membership here of any considerable number is Italy; and I am going to call next on Mr. Carlo Valentini, Engineer in Chief of Civil Engineering, of Bologna, Italy. (*Applause.*)

Mr. **Valentini** (in French) :

Mr. President, Ladies and Gentlemen,

I have the honor of speaking on behalf of the first delegate of Italy, who has been prevented from coming to Pittsburgh. I might have been tempted to decline this honor, as so many of the speakers who have preceded me have expressed much more eloquently than I can the sentiments with which we have been filled since our arrival in the United States; namely, the admiration, and moreover the astonishment, with which we have witnessed the marvellous progress of your industries and manufactures, a progress which has exceeded all expectations; as well as the sentiments of gratitude we feel towards the Ladies and Members of the Organizing Committee, and all the Local Committees, who have known so well how to welcome us, and how to facilitate the inspection of your admirable city. (*Applause.*)

But, although I am but a mere delegate, I feel that it is my duty to reiterate these sentiments of gratitude and admiration, and to assure you especially of the deep and lively gratitude of all the Italian delegates and members. Long live the United States! Long live Pennsylvania! Long live the prosperous and hospitable city of Pittsburgh! (*Loud applause.*)

Brigadier-General **Bixby** (in English) :

Another country with a great many members, and a country very much like ours, is Russia. And it is with great pleasure that I am asking Mr. Emile de Hoerschelmann, Councillor of State, Member of the Principal Council of Public Works, Ministry of Ways and Communications of all kinds, of St. Petersburg, Russia, to say a few words to you on the part of Russia. (*Applause.*)

Mr. **de Hoerschelmann** (in French) :

Ladies and Gentlemen, and Honoured Colleagues,

A journey from Russia to the United States, takes up much time and interferes considerably with one's daily work, and this is the cause which has prevented many Russian Members of the Permanent International Association of Navigation Congresses from taking part in the Congress of Philadelphia, with the result that only a very small number of us have been able to attend this Congress. But we may truly say that all our other Russian colleagues of the Permanent Association would have been only too delighted to come here and witness with us the marvellous progress which has been made in engineering science in the United States. We can therefore, on their behalf, congratulate American experts and engineers. We who have come here, have all journeyed from east to west, but there

is another way in the opposite direction, of coming from Russia to America, and some of our colleagues intend to return to their own country in that manner. When we think of it, it is precisely in that direction that the United States and Russia are neighbours without any intervening party, and the gigantic work of the Panama Canal, now in course of execution, will facilitate the use of this route by enabling one to reach the hospitable shores of Pennsylvania from the extreme east of Russia by a direct sea route. This neighbourhood of the two countries is especially typified in their navigable waterways, which have much in common. We are particularly glad to point out this fact to the Navigation Congress, and we trust that this similarity will intensify the mutual sympathies of the engineers of both countries.

In conclusion, I will ask you to allow me to add a few words in the native language of this marvellously hospitable country.

(Continuing in English.)

Let me, in the name of the Russian members of the Congress, express our feelings of thankfulness for your splendid hospitality, and our wishes for further progress and prosperity of the community of Pittsburgh, of her citizens, and of all the American Members of the Congress.

Brigadier-General **Bixby** (in English) :

Switzerland is a country well known to those members of you who have enjoyed the beauties of the Jungfrau and the Matterhorn. Switzerland is represented in this congress; and I take great pleasure in introducing to you the Minister from Switzerland to the United States, Dr. Paul Ritter. (*Applause.*)

Dr. **Paul Ritter** (in English) :

Ladies and Gentlemen,

Switzerland is a country well known to most of you who have enjoyed the beauties of the Jungfrau and of the Matterhorn. But when you sat on the boulevard of Lucerne overlooking the peaceful lake, you certainly never had the impression that Switzerland was interested in any international navigation problem. But she is! We are improving our rivers, the Rhine and others, and the day may be near that ships will come up from the sea to the lake of Constance. This will be a new source of welfare and of attraction to my country and I hope that you may all visit us at some time, to enable us to repay the courtesies that we the Swiss delegates have enjoyed here in such a large measure.

I have been all over the world, but I assure you that I never saw an industrial centre which impressed me more than Pittsburgh did to-day, and

that more charming hosts than the inhabitants of this town and of Philadelphia could nowhere be found. Therefore accept our heartiest thanks for everything you have done for us.

Brigadier-General **Bixby** (in English) :

There has been no opportunity for ladies to speak, so I want to put on record before we go, the universal expression of appreciative thanks by the ladies of our party and by the gentlemen who are with them for the handsome way in which they have been treated by the ladies of Pittsburgh : (*Loud applause.*) and so saying we close this meeting.

The members of the Congress then dispersed, enchanted with the pleasant evening they had spent.



Interior of Westinghouse Works, Pittsburg, showing electric locomotives.

On the following day, the 1st of June, they all met together at the Union Station, and left for East Pittsburgh by special train. The visit was for the purpose of examining the works of the Westinghouse Electric and Manufacturing Co., and of the Westinghouse Machine Company. Representatives of these Companies were on the train, and gave each member a descriptive pamphlet

of these important works. Other guides awaited the members of the Congress at the railway station on arrival, to take them through the works. The works of the Company which manufactures small electric motors, winding coils in generators, transformers, and other auxiliary apparatus, were first visited. The party also visited the shops where large and moderate sized motors and generators of both water wheel and engine types, electric locomotives, (several locomotives for the New York, New Haven and Hartford Railroad, being under construction,) are manufactured. After having inspected lightning protection apparatus, the system of arc welding used in the manufacture of railway motors was exhibited. A visit was then paid to the adjoining works of the Westinghouse Machine Company, where the members of the Congress witnessed the various stages of the manufacture of steam turbines and of Westinghouse-Melville-McAlpine reduction gear. This gear is for reducing the inherently high speed of the turbine to that suitable for ship propulsion, and to that of the electric generator.

After the visit a buffet luncheon was offered to the party by the Westinghouse Electric and Manufacturing Company in its new buildings. At the conclusion of the luncheon the President of the Company, Mr. E. M. Herr, expressed his great pleasure in receiving such a distinguished body of engineers, and hoped that the pleasure had been mutual. The Hon. John M. Goehring, President of the City Council of Pittsburgh, responded on behalf of the Pittsburgh Local Commission, and was followed by Brigadier-General W. H. Bixby, President of the XIIth Congress, who spoke on behalf of the members of the Congress and then by Mr. Zanen delegate for Belgium, who returned thanks as follows.

Mr. **Zanen** (in French) :

Mr. President, and Gentlemen,

Allow me in the first place to thank Brigadier General Bixby on behalf of the Belgian delegates, for the kind remarks he made yesterday. I also thank the authorities, and the members of the Organizing Committee of Pittsburgh, who have received us so warmly and cordially. On our arrival at Pittsburgh we had the good fortune to listen to most interesting lectures on the rich district which was about to be shown to us, on the hydraulic

works of the Ohio river, and on the new waterways which are proposed to connect the great lakes of the north and the Mississippi.

We were able to visit the works on this river yesterday, and we have inspected one of the most important steel works of the American Bridge Company, where we have admired the perfection of its plant, and its methods of handling material.

Whilst crossing a region which possesses such wealth underground, and which has enabled industry to make such an enormous and rapid development, we could not help thinking of our little Belgium, and taking back our thoughts to the coalfields of Charleroi, Mons, and Liège, where the metallurgical industry has also taken a comparatively important extension. To-day, by the courtesy of the Westinghouse Electric and Manufacturing Company, we have seen its immense works where everything germane to electricity is manufactured, and we have received a charming welcome.

A staff of 13,000 workmen, 2,000 employees, and a weekly wage roll of 1,000,000 dollars, suffice to indicate the importance of these works which we have been privileged to visit, and the interest which this inspection must necessarily have for us.

I conclude, Gentlemen, by expressing our gratitude to all those who have contributed making our sojourn so useful, so instructive, and so agreeable. (*Loud applause.*)

Other members of the Congress, desiring to speak made a few brief remarks to express their gratitude.

On their return to Pittsburgh by rail, the members of the Congress were shown the sights of the city in automobiles which had been graciously placed at their disposal. Stops were made at the "Carnegie Institute," and finally at the "Pittsburgh Country Club," where they were heartily received.

The ladies had not accompanied the party in the visit to the Westinghouse works, but were entertained by the Ladies Auxiliary Committee of Pittsburgh, and whole of the day of June 1st was devoted to long automobile tours. During the luncheon given to them at the Pittsburgh Country Club, Mrs. **Max Muhlen** of Belgium, expressed the thanks of the foreign ladies to the Committee, for the trouble taken in entertaining them.

At 10 p. m. the whole party boarded a special train consisting of sleeping cars, and were taken back to Philadelphia, perfectly enchanted with their interesting and instructive visit to Pittsburgh.

Final meeting at Philadelphia and Banquet offered by the Commission of the State of New Jersey.

The members of the Congress were convened for a final meeting at Philadelphia, at the Bellevue-Stratford Hotel on June 2nd. Announcements were made concerning the excursions about to commence on the following morning. These trips were to be made under the direction of Brigadier-General W. H. Bixby, Acting President of the General Organizing Commission. These trips were, as a matter of fact, to be carried out under the auspices of the United States Government, which was represented by the last-named Commission.

The Hon. **J. Hampton Moore**, President of the Local Organizing Commission, expressed briefly the regret of the Philadelphia people that the members should have to leave that city so soon. They hoped, he added, that the members of the Congress would always retain a pleasant memory of their stay.

Mr. de Timonoff, Acting President of the Association, responded in the following terms :

Mr. de Timonoff (in French) :

Mr. President, Ladies and Gentlemen,

You have just heard the eloquent remarks of Mr. J. Hampton Moore, the indefatigable and brilliant President of the Local Organizing Commission. On the eve of your departure from Philadelphia he expresses the bonds of sympathy which the Organizers of the XIIth International Congress of Navigation have with you who have come from so far to take part in our important meeting.

Allow me to say on your behalf that these sentiments are reciprocated by us all, and that a sentiment of deep gratitude inspires us, in addition to the sympathy which has been spontaneously aroused between us and our American hosts. The task of the Local Commission has been great and commensurate with the importance and extent of the United States, of the State of Pennsylvania, and of the City of Philadelphia, which have all welcomed us so graciously. The Commission has accomplished its task brilliantly. It has known how to amuse whilst instructing us, and if our sojourn here will leave us pleasant recollections it will also inspire us with

useful knowledge for our future work. And this knowledge is not necessarily confined to technical or professional matters. However important the work of rivers and ports you have visited may be, however interesting the publications you have received may be, you have been privileged to gather still more useful information here. You have seen how the American nation is building up its future. You have been enabled to appreciate the marvellous strenuousness of all and sundry; that strenuousness which, having fixed upon a national ideal, never relaxes until this ideal is attained. You have heard and admired the workers of this nation, who are so simple and yet so great, and who are leading the United States to the most glorious destinies.

Among these American statesmen you will remember more particularly the Hon. J. Hampton Moore, whose qualities you have now had an opportunity of appreciating on so many occasions. I feel sure you will join with me in wishing him all the success he deserves, knowing well that this success will go hand-in-hand with the welfare of his country and of his nation.

Mr. de Timonoff's speech was loudly applauded by all the members present, and the party separated with regret that the few days which had been so enjoyably spent at Philadelphia and in the State of Pennsylvania, should have passed so rapidly. In the evening, the Government delegates were invited, together with a large number of Representatives of the United States Congress, to a banquet given by the New Jersey State Commission, which was served in the red room of the Bellevue-Stratford Hotel. The Governor of the State of New Jersey had appointed the Commission to take charge of the party while in New Jersey. This Commission was composed of the Hon. Frederick W. Donnelly, Mayor of Trenton, Chairman, Mr. Worthington M. Jacobus, Mr. J. Spencer Smith, Mr. Charles McCormick, and Mr. James M. Reilly, Secretary.

After dinner, at which Mr. Donnelly presided, a number of informal addresses were made. Allusion was made in the first place to the improvements of innavigable waterways contemplated by the State of New Jersey, and also regarding the work of the Congress. Mr. **Biankenburg**, Mayor of Philadelphia, said that the friendly relations established during the last two weeks by the delegates of many nations represented at the Congress would bear fruit towards paving the way for universal peace.

Mr. de Timonoff, who was warmly received, then spoke on behalf of the Association, and returned thanks in the following terms :

Mr. de Timonoff (in French) :

Mr. President, and Gentlemen,

This banquet which is the fore-runner of a very interesting excursion through the State of New Jersey, also concludes the visit of the XIIth International Congress of Navigation to Philadelphia and Pennsylvania.

The moment has now arrived to look back briefly upon the days of work and pleasure that we have passed at Philadelphia and in the other cities of Pennsylvania. Those days will never be forgotten by all who have taken part in the brilliant meetings of the Congress and who have enjoyed the hospitality extended by our American hosts. Looking back, we remember the gracious ladies and the distinguished persons who have exerted themselves so much to make our Congress as useful as such an important international meeting should be, and who have done so much to render our experiences agreeable ones. If it were possible, I should like to refer to the individual work of our American hosts of both sexes, who have aroused our warmest sympathies and admiration. But their number and spheres of activity are so numerous that I shall limit myself this time to the mention of one only; the one who, as General President of the Congress, symbolizes all the activities which have ensured its eventual success. I allude to Brigadier General Bixby, Chief of Engineers of the United States Army. (*Applause.*) I have known Brigadier General Bixby for 36 years. We studied engineering together in Paris at the Ecole Nationale des Ponts et Chaussées of France, and I well remember the high opinion in which he was held by his Professors and his contemporaries. All the qualities which eventually brought him to the high position he now occupies were already discernible in him at that time. He was an exemplary student, and an accomplished gentleman loved by everyone.

The XIIth International Navigation Congress has increased considerably the number of friends and admirers of Brigadier General Bixby. Many other friendships have been consolidated during the period of the Congress which is now over.

Friendly demonstrations will certainly continue during our excursion in the State of New Jersey. I shall take part in these with the greatest pleasure, and on behalf of the Permanent International Association of Navigation Congresses I beg to express my most hearty thanks to the inhabitants of the State, and to its Governor, His Excellency W. Woodrow Wilson; and also to the members of the Local Committee which has been constituted for the purpose of drawing up the programme of our reception.

The banquet closed after this speech which was much applauded.

Excursion in the State of New Jersey.

The members of the Congress who returned from Pittsburgh on the Sunday morning left Philadelphia on Monday the 3rd June at 8 a. m. the party numbering about 240, and boarded a special train of the Pennsylvania Railroad Company at Camden, which was to convey them to Perth Amboy, in the State of New Jersey. The trip, organized by the New Jersey State Commission, had New York for its ultimate destination.

The special train, after leaving Camden, proceeded northward along the Delaware river, and made its first stop at Bordentown in the new State which the Members were about to visit. This point is the western terminus of the Delaware and Raritan canal, and it is also the terminus of the projected ship canal across the State of New Jersey. On descending from the cars, the party were received by a salute of thirteen guns, fired by a battalion of Cadets from the Bordentown Military Institute under Command of Major **C. H. Langdon**.

Mr. **Cermelmann**, Geheimer Oberbaurat at the Prussian Ministry of Public Works, replied to this welcome in the following words, which he addressed in German to the Cadets.

Mr. **Cermelmann** (in German) :

My young comrades,

If I speak here as an old soldier, it is because I am filled with sentiments of gratitude and joy. My dear Commandant, you and your cadets have provided the International Congress of Navigation with a spectacle which takes us back a hundred years, when the valiant Indians of the Delaware owned these lands, and carried out their warlike exhibitions. If this day's incursion has not been that of a redoubtable enemy but of a peaceable body of men from all quarters of the globe, the way in which your battalion has received us is a testimony of the promptitude and efficiency with which you would have met a real invasion. It is an eloquent proof of the foresight of your Commandant, and of the energy and excellent training of his men.

On behalf of the members of the Congress here present, I wish to express to you our grateful and most sincere thanks.

I am convinced that if this battalion, which is so soldierly in appearance, should be called upon one day to defend its Fatherland it would show



Proposed sea-level Canal across New Jersey, and its relation to existing Waterways.

the same fearlessness and devotion to duty as it has shown to us this day in its manœuvres.

As an indication of the confidence and strength of purpose with which your troop inspires us, we Germans might well sing our National Hymn "*Fest steht und treu die Wacht am Rhein!*" whilst America could proudly and confidently sing "*Fest steht und treu die Wacht von Bordentown.*"

Long Live the Military Institute of Bordentown! *Hurrah! Hurrah! Hurrah!*

The proposed works were explained in detail to the members of the Congress, and Mr. **Donnelly**, Mayor of Trenton and Chairman of the State Commission of Receptions, called the attention of the French delegates to the fact that they were standing on the old estate of Joseph Buonaparte.

"One year ago," he continued (in English): "I stood at the same place "with the Rivers and Harbors Committee of the United States Congress, "and inspected the old Delaware and the Raritan canal with its 7 foot "channel. To-day we are driving the first wedge, figuratively, in the greater "enterprise—the most important link in the whole line of the proposed "Atlantic-intra-coastal waterway."

Colonel **W. M. Black**, Corps of Engineers, U. S. A. Chairman of the Board of Engineer officers, who had made the survey and estimates for the proposed intra-coastal waterway, then described the plan for the New Jersey section of that waterway, and the arrangements made so that there should be a minimum of interference between the land and water traffic.

A brief description was also given to the members of the Congress regarding the tidal and freshet conditions of this new waterway.

There are, said Colonel Black, (in English) 54 million tons of freight transported annually between New York and Philadelphia. Water transportation will be more rapid than rail transportation, because of congestion at the railway termini.

The necessity for the proposed waterway has been under discussion for years, and finally a survey was ordered by Congress two years ago. The proposed line is to follow the line of the existing canal for a mile and a half, and will then be diverted. The survey shows that there will be practically no rock excavation. There will be no difficulty with tidal currents. Railway crossings will be few, and the bridges can be built of

such a character as to make little obstruction to the canal passage. The only important railway line crossing the canal will be the Pennsylvania line which crosses at Jamesburg, where the clearance will be 110 feet. All that is needed to make the enterprise a success is money.

Pamphlets describing the proposed works and outlining their object, had been distributed to the members of the Congress. It had long been acknowledged that the system of inland canals which run almost parallel to the Atlantic coast line, and which were built about 1830 to connect the Bay of New York with the Delaware, the Delaware with the bay of Chesapeake, and the bay of Chesapeake with Albemarle Sound, were no longer adequate for commercial requirements, because they were too small. In 1909, thanks to the efforts of the "Atlantic Deeper Waterways Association," of which the Hon. J. Hampton-Moore is the active President, the United States Government appropriated certain sums for investigating a new line of intra-coastal navigable waterways, from Boston, Mass, to Beaufort, North Carolina. This survey was rapidly and successfully accomplished.

The section which is to cross the State of New Jersey was considered the most important, and its cost, estimated at 45 million dollars, greatly exceeds that of the other sections. This will be a ship canal without locks, running along the Delaware river for a distance of 33.7 miles, and it will be 125 feet wide at the bottom, and 25 feet deep at low water. Raritan Bay and the Delaware river will be deepened in accordance with this navigable depth.

The construction of this navigable waterway will enable ships to reach New York either by the lower and upper Bays of New York, or by the Sound of Staten Island and Kill von Kell, and the upper Bay of New York. The Delaware river will be widened for a distance of 4 miles between Trenton and Bordentown, so as to connect the city of Trenton with the canal. The route of this navigable waterway is very direct, and will show a saving in length of 187 miles on the "outer route" which goes via the Delaware and the Atlantic ocean.

On leaving Bordentown the train proceeded to Jamesburg, where a stop was made to view the greatest engineering feature along the route of the proposed canal, at a point where the

Pennsylvania Railroad will cross over the canal. About 500 boys in military uniform, from the New Jersey Home for Boys, in charge of Superintendent **Kaleen**, and headed by the band of that institution, greeted the delegates on their arrival. The Hon. **Eugene Kinkead**, Member of Congress of Jersey City, thanked the boys for their reception and Professor **Hilgard** of Zurich also spoke to them and predicted for them bright careers as citizens "of the great and glorious United States." The party then proceeded by train to Perth Amboy, which is at the mouth of the Raritan river, and near the point in the Raritan Bay at which the proposed canal will terminate. A light lunch was served on board, and at Perth Amboy the members were transferred from the train by trolley cars to the steamer "**Majestic**" on board of which were the members of the Newark Reception Committee, headed by Mayor Haussling. From Perth Amboy to Newark the boat proceeded to Staten Island Sound, Newark Bay, and the Passaic river to New Jersey, where they arrived about one o'clock in the afternoon.

A stop was made in this city, and a luncheon offered by the New Jersey State Commission, was served in the Washington Restaurant. Mr. **Donnelly**, Chairman of the State Commission, who presided made, at the close the luncheon, a brief address on behalf of the Governor and people of New Jersey, expressing the pleasure it gave them to receive the distinguished foreign engineers of the Association of Navigation Congresses, and the members of the United States Congress, and to explain to them on the ground the interesting and important projects of the State for the improvement of its waterways. He then introduced Mayor **Haussling**, who welcomed the visitors to the city in a few cordial words. Mr. de Timonoff, Acting President of the International Association of Navigation Congresses then responded on behalf of the Association, as follows.

Mr. **de Timonoff** (in English):

Mr. Chairman, Ladies and Gentlemen,

Your time is very short and so many of the members of the XIIth Navigation Congress who have taken part in the today's excursion ask for the honor to address you and give you the impressions they have

gathered during our journey through New Jersey. On the other hand, you must leave this hospitable hall as early as possible in order to pay, before you depart from Newark, a visit to the most remarkable inventor of the XIXth and XXth centuries—the celebrated Thomas Edison. Under such conditions, the Acting President of your Association should be inexcusable if he took much of your time by a long speech, even if this speech were of great value.

I feel, therefore, necessary not to yield to the temptation of talking about the project, so interesting, of the new deeper Atlantic waterway, the location of which we partly visited today, about the kind greetings of the people and children of the State of New Jersey, about our wishes of prosperity and success to this State and its projected new waterway. I will only, on behalf, of you all, say our sincere thanks to the State of New Jersey and the cities of Trenton, Bordentown, Jamesburg, Perth Amboy and Newark, to the Local Reception Committee of this State, and more especially to the Governor Wilson and to the Mayor Donnelly, for all their hospitality. (*Applause.*)

Mr. **Paul Knabe**, also thanked the local Authorities for their kind reception.

After him Mr. **Van der Vin**, the Belgian delegate, spoke as follows (in French):

Ladies and Gentlemen,

When we consider that it is hardly 300 years ago that Hudson discovered the river which bears his name, we may well be astounded when we look upon the country watered by this river, which is so populated, so advanced, dotted with such numerous towns—many of them magnificent, all of them prosperous—and which has such marvellous industries and means of communication crossing it in all directions.

One would think that this hive of industry had sprung up suddenly out of the ground at the command of some magic wand.

This magic wand, Ladies and Gentlemen, is the science of the engineers, which has created marvels and transformed the world.

We place ourselves under its invocation, and it would appear as if it can refuse nothing to our American colleagues in whatever domain they may make their requests.

To-morrow we shall visit the famous Barge Canal, a grandiose modern enterprise, whilst to-day we have traversed part of the territory which is to serve for this gigantic intra-costal canal, of which the proposed route has been pointed out to us—a work of unrivalled boldness which will connect the north and south of the United States, Boston and Florida. We admire enterprises of this kind. They are examples to us of what can be done, and of what should be done for the rational development of

navigation, and for the maintenance of the economic superiority of transportation by water within suitable limitations. The Barge Canal is already on the way to completion. We know that the proposed intra-costal canal will materialize, because it is desired by Americans, a nation which has been able to modify the map of the world for the welfare and glory of humanity by joining two oceans.

We are very grateful to the Government of the State of New Jersey, and to the Municipality of Newark for the programme they have organized which has enabled us to become acquainted with and visit so many interesting places. We are very indebted to them for their magnificent reception today, and let me tell you that we are particularly sensible of the amiable, frank, and sincere cordiality with which we are received here, and which makes us feel that all those whose acquaintance we have made are our friends, from whom we shall part with the greatest regret when we leave American soil.

Ladies and Gentlemen, I drink to the growing prosperity of the United States, the country of independence and progress; the country of cordial hospitality. I drink to the success of the great work which the State of New Jersey is about to undertake in the sphere of navigable waterways. I raise my glass in honour of the city of Newark, which is so fortunate and so proud as to number the great Edison amongst its citizens; that illustrious engineer whom we are so sorry not to be able to welcome among us at this moment, but to whom we shall presently render the admiration and veneration which his great work and great personality inspires us with.

This speech was loudly applauded, and then Colonel **W. N. Black**, of the Corps of Engineers, U. S. Army, President of the intra-coastal waterway Board, addressed the Members of the Congress.

The last speaker was Captain **Matsumura** of the Japanese Navy, and delegate of Japan, who thanked the State of New Jersey, and the Local Reception Committee for their large hospitality.

A souvenir publication describing the State of New Jersey, and a handsome brass relief map of the State were presented to each member of the Congress at the luncheon.

Immediately after the luncheon, the party was taken on special trolley cars to the Laboratories of Orange—a suburb of Newark—belonging to Mr. Thomas A. Edison, the famous inventor; who cordially received them in his library, and conducted them over his entire plant. His recently improved phonograph was listened

to with interest, and he exhibited to the American Congress a series of specially prepared motion pictures showing the work in progress in the construction of the Panama Canal.

Returning to Newark, a special train was taken to New York, and the party arrived at the new station of the Pennsylvania Railroad Company in the great American capital at 6.45 p. m. From the station the party proceeded to the two hotels; the Astor Hotel and the Great Northern Hotel, at which they were to stay.

Reception of the Members of the Congress by the American Society of Civil Engineers, and sojourn in New York.

The members of the American Society of Civil Engineers received their foreign colleagues on Monday, June 3rd, at 8.30 p. m. at the house of the Society, 220, West-fifty-seventh Street,



Pennsylvania Railroad Station, New York.

New York, which was handsomely decorated for the occasion. 175 Members of the Association participated in this enjoyable gathering, but the lateness of the arrival in New York, and the

fatigue due to the busy day spent in New Jersey were accountable for the fact that some of the members were unable to respond to the kind invitation of their American colleagues. Those who were courageous enough to come were enchanted with the evening they spent in the rooms of the Society.

The members of the Congress were received by Mr. John A. Ockerson, President of the Society, and by the Committee of engineers which the Society had appointed to arrange the details of the New York visit, and for visiting the port and the most interesting works in this remarkable locality.

Several speeches were made at the gathering. Mr. Ockerson first spoke, and he was followed by the Hon. G. McAneny, representing New York city, who both congratulated the members of the Congress. Several foreign delegates replied, and thanked them for their welcome. Mr. **John A. Ockerson** then spoke as follows, (in English.)

Members of the Twelfth International Congress of Navigation,
Ladies and Gentlemen,

It is indeed an honor and a pleasure to greet in the home of the American Society of Civil Engineers, such a body of distinguished visitors from distant lands.

Your labors at the Congress have been finished and you have already examined some of our important public works, but this feature of your visit has scarcely yet begun.

You are now in the home of the American Society of Civil Engineers, whose members have both planned and executed the larger portion of the works you have already seen, and are yet to see before your tour is ended.

We have 6,500 members scattered throughout the length and breadth of this continent and in 36 foreign countries, and our annual increase in membership is something over 500. We are proud to note that some of your distinguished members are also members of this Society, but please do not forget that we have an abundance of room for more.

The speaker had the honor of attending three meetings of the Congress in Europe,—Paris, Milan and St. Petersburg, and at each and all of them, was deeply impressed with the admirable manner in which they were conducted, and the lavish hospitality which was extended to all participants.

While the example there set is indeed difficult to follow, it is hoped that the reception accorded you by the American people will prove to be equally gratifying to you.

At the closing ceremonies of the Eleventh Congress of Navigation at St. Petersburg, it became my duty to respond for the United States, and the hope was then expressed that we should soon have the honor and the pleasure of greeting you on this side of the Atlantic.

It is therefore particularly gratifying to extend to you at this time in behalf of the American Society of Civil Engineers, a most cordial and hearty welcome. (*Loud applause.*)

You are doubtless aware that New York is the largest of our American Cities, and one of the greatest seaports of the world. We expected to have with us to-night the man who rules successfully over these millions of people, the Honorable William J. Gaynor, but he was unable to come. There are other men, however, in the official family of this great City who bear an important part in its management, and perhaps none of them more so than the Honorable George McAneny, Pr, President of the Borough of Manhattan, whom I now have the pleasure of introducing. (*Applause.*)

The Hon. **J. McAneny** (in English) :

Mr. Chairman, Ladies and Gentlemen,

I am sure that it is with peculiar pleasure that I welcome you to-night to the first of the sessions that you will hold, sessions of any character or degree, within the City of New York.

As your chairman has said, the Mayor, unfortunately was unable to be present to-night, but it is his intention to receive the delegates as they start upon the tour of our water front under the leadership of our Commissioner of Docks tomorrow morning, and I am sure the Mayor will gladly welcome that opportunity.

We have in New York a problem—we like to call our difficulties problems, and we classify and entitle them accordingly—but we have our waterfront problem among others, and we are dealing with various phases of it.

We are now receiving, I understand from the figures of the last year's reports, the greatest tonnage of any port in the world. We have taken finally that place in our evolution as a sea port, but we must confess sadly that whatever our future plans may be for dealing with this problem our facilities as yet lack sadly when compared with the greatness of our mission in commerce, and the greatness of our opportunity; but we have fortunately in this administration of the City Government a most comprehensive and imaginative, I might say, in the best sense of the word, and a most determined administration, of our dock and water front property; and this administration with the aid of those who handle the finances and must pass upon the appropriation according to the needs of all the city and for all of its purposes, hopes to make a start before very long upon work that will give us our proper place, give us the facilities that really

are commensurate with the commerce of the port, and really bring it in touch with the great opportunities of the future.

We are fond of expressing our plans in America in dollars and cents. I believe we are accused of that, and I suppose it is true that we are justly accused of it. Let me tell you that we are planning to expend something like fifty millions of dollars upon our river and harbour improvements within the next three or four years,—certainly upon work that may well be started in that brief period of time.

Our Federal Government takes care of our channels, of everything that lies beyond our pier and bulkhead lines, but within our own territory, in the mere matter of docks and piers and marginal facilities, we have a great chance; and as I have said, we hope to meet it in proper fashion; and so it happens that your coming here is fortunate for the City of New York; it is a glorious thing for all of us.

We are greatly honored by your presence in America, and we are greatly honored by your presence in the City of New York and selfishly, we derive the added satisfaction that you come at a time when we are thinking and talking about these things and you cannot fail to leave with us lessons and suggestions, and place before us an example that will be of great profit to us as we proceed with our work.

It has been suggested to me to-night that there is no Congress on earth that draws together so many official representatives of the several Governments as this, unless it be the Congress at the Hague,—a Congress for peace; and it has occurred to me that, after all, in one sense you are doing the same kind of work, that yours is a Congress for peace as well as the political Congress at the Hague, because your mission is to bring together the ships of peace, to give them their chance, to utilize their influence in that respect, through making way for them in the great ports of the world; and I have a feeling that the more ships of peace there are afloat, the less need in a sense there will be for the ships of war. (*Applause.*)

The more costly war becomes because of the greater measure of destruction it involves, the more abhorrent it becomes for practical reasons of that kind, the more our inclination to go to-war is decreased, and as you broaden and deepen and develop our harbors and bring all the great ships of the earth in touch with their opportunity in the service of commerce, you are very materially, in my judgment, lessening the chances of war; you are turning the attention of men to the arts of peace, you are serving peace; and the suggestion of your second place therefore to the great Peace Congress at the Hague has more than one significance.

Your mission to us, of course, is that of peace. I have told you of what we will owe you when you go away because of the suggestions that you may make. I trust in turn you may find something here and there, something in what we are doing that you will find worth while to take away with you.

Very frequently, perhaps most frequently, you will find that we have merely taken something from you and developed it in our own way, and are giving it back with a trifle of interest here and here; but, nevertheless,

that we are doing original work along those lines, and doing it with the best that is in us, because I do not believe there is anything in our vigorous and pressing American life that so loves to find its expression as the things that flow from the art of engineering.

It is not merely the development of our rivers and harbors, which commands our attention now, that may interest you.

If I may come back again to the instruction that dollars and cents give, let me tell you as an item of interest that the City of New York, one municipal community, great though it be in numbers and in wealth, still a city and not a state, that the City of New York is perfecting plans to-day for a great new addition to its transit system that will involve the expenditure of three hundred and ten millions of dollars within the next five years; that it is about finishing under the leadership of a distinguished member of this Society a system of new water works, which, when completed, will reach one hundred and sixty millions of dollars; that there are six hundred and fifty miles upon our water front that we are preparing to improve; that we have a survey now two years under way for a new sewer system for this island that will cost thirty million dollars more; that, aside from that, our private enterprises, which in your countries so often are public as well, our railroads, for instance, and two of those railroads, the Pennsylvania and the New York Central, in the development of their terminal facilities and plant here in the City of New York are spending two hundred millions of dollars.

So we come to the fact that the City of New York in a sense out of its own revenues and its expenditures, direct and indirect, is spending for the benefit of these few passing years, of five or ten, some thing like seven hundred and fifty millions of dollars; and what that means, in activity, in employment, from the engineer down to the merest laborer, I leave to your imagination; what it means to the City of New York, the great city of the future, five millions of people to-day, ten millions some day, what it means to this city as a basis for the wonderful growth that we see very clearly, I will also leave to your imagination.

But let me acknowledge very frankly the fact that all of that great work is being done by the engineers; that the City of New York owes no debt comparable to that which it owes to its engineers, and those whom it has called in to aid its work or to aid in its work. That is the thing that I should like you gentlemen from foreign parts to take away with you, the fact that we recognize our engineers here, that they are the bulwark of our public system.

We are throwing our politics out of our cities, and we are taking to the engineers and the others who will build for us in the best fashion and along the best lines; and let me again thank you who represent the engineers of these other lands and represent other governments, so many of you holding great and responsible positions in the service of those governments, let me thank you for coming here and stopping a while with us.

I hope you will see and enjoy what we have to offer during the next two or three days and you need never doubt the heartiness of our welcome, never doubt our wish that some day you may come to us again. (*Applause.*)

Mr. John A. Ockerson (in English) :

Those of you who attended the Eleventh Congress of Navigation at St. Petersburg, cannot forget the admirable manner in which it was conducted through every phase of that event, whether relating to the more serious work of the Congress or the social features connected therewith. I take pleasure in presenting the President of that Congress and the acting President of the permanent association, Mr. V. E. Timonoff, Engineer of Ways of Communication, and of civil constructions, Professor in the Institute of the Engineers of Ways and Communications, St. Petersburg.

Mr. V. E. de Timonoff (in English) :

Mr. Chairman, Ladies and Gentlemen,

I thank you most cordially for the way in which you have received in the House of the American Society of Civil Engineers the Permanent Association of the Congresses of Navigation, which I had the honour to represent during the session at Philadelphia.

Im am also extremely sensible of your kindness and all that they imply, because it gives me the opportunity to express my great admiration for the activity of American engineers. My thoughts turn to the great work which has been done by those who have laid down the greatest quantity of railroads and waterways, upon which in a general sense the civilization of countries is most greatly dependent. They have improved navigation, bridged waters and built railroads to the remotest regions of the new continent.

We associate American engineers with almost every great undertaking of the age. I may mention that the great wonders of engineering that we have seen in connection with the waterways, railroads, and so forth, are the most marvellous works of their kind.

Engineering science is able to test the truth of the principles which engineers wish to apply. It is the contrary of politics that one never knows whether experiments are to be successful or not.

Engineering is the happy state of things where experience can always follow the application of principle, and theory can be justified by the result of experiment.

American engineers duly extended their attention on the qualities that cause their success, and their role in the advancement of science is as great as the practical result of their activity.

Let me conclude by wishing further successes of American engineers in all branches and in all practical and scientific work, and more especial-

ly for the great organization which bears the noble name of the American Society of Civil Engineers. (*Applause.*)

Mr. John A. Ockerson (in English) :

Twelve years ago this society made a pilgrimage to England where we were royally received and entertained by the members of the Institute of Civil Engineers of Great Britain.

Pleasant recollections of that visit still linger with us and we will be pleased to hear from a representative of that country, Lieutenant Colonel H A. Yorke, Chief Inspector of Railways, whom I now present.

Lieutnant-Colonel **H. A. Yorke** (in English) :

Mr. Chairman, and Ladies and Gentlemen,

I am gratified to you for this opportunity of expressing, on behalf of my country my warmest thanks for the gracious and cordial welcome extended to us by the American nation, and by the American Society of Civil Engineers.

If I may add a personal note, I should like to add on behalf of my wife and myself our sincere thanks and gratitude for the kindness and hospitality extended to us personally.

There is an old proverb that says: "Friends like mushrooms spring up unexpectedly," and in no part of the world is this more true than in America.

I remember the occasion of my first visit to this great country several years ago, and that as I landed on the quay of the docks of this city I felt somewhat sad and lonely, for, so far as I knew, I was not acquainted with a single individual in all this great country.

Judge, therefore, my surprise and delight, when, as it were, from the ground a friend sprang up to hold out his hand to greet me. He introduced himself to me; I had never met him before, but I had been commended to him by a mutual friend in England. I did not even know his name at the time. I should like to mention it now with gratitude. It is the name of Mr. Charles Hansel.

He at once constituted himself my friend, my counselor and guide. He passed me from hand to hand and from friend to friend, so that when, at the end of a six weeks' tour of this country, I set sail again for old England, a feeling of sadness again came over me, not because I was feeling friendless, but because it seemed to me that I was bidding farewell to a nation of warm and intimate friends.

Again, only the other day, as I landed in this City, my wife and I were met by our kind friend, who is here this evening, and that is Mr. Corthell; he welcomed us and assisted us, and made us feel at home. To his

personal and kind assistance we owe much of our enjoyment during these last few weeks.

I have lately read that heaven's delight is human kindness to the traveller on his way, and I can testify from personal experience and with a full heart that in warm and spontaneous hospitality to the stranger within your gates it is true that America is the traveller's paradise.

Ladies and gentlemen, I thank you. (*Loud Applause.*)

Mr. John A. Ockerson (in English) :

None of the countries which have joined in the permanent association of the Congress of Navigation have taken a more active part or contributed more towards its success than Germany. In attendance, in its papers and its discussions, Germany has always been well to the front. We will therefore be pleased to hear from Freiherr Franz von Coels von der Brügghen, Assistant Secretary of State in the Ministry of Public Works.

Mr. von Coels von der Brügghen (in German) thanked the American Society of Civil Engineers, and particularly its very amiable President, Mr. John A. Ockerson, for the cordial welcome of their foreign colleagues who had been received with open arms in the magnificent city of New York, as if they were good friends and old acquaintances. Just as New York occupies the front rank of American cities, so the American Society of Civil Engineers is by far the most numerous and most powerful Society on the new Continent, where it is shining light in the scientific world. The United States owe their enormous economic development and prosperity to this Society and to the knowledge and capacity of its members. Foreign experts genuinely admire their American colleagues, who have contributed so large a share to the enormous scientific out-put of all the engineers in the world.

Mr. von Coels von der Brügghen's speech was loudly applauded.

Mr. John A. Ockerson (in English) :

We have with us to-night, fortunately, a gentleman from our neighboring country, Canada, Colonel Anderson, whom we will be very glad to hear from.

Colonel Anderson (in English) :

Mr. President, Ladies and Gentlemen,

This is the first time that I have had the opportunity of being in this room, and yet I cannot feel that I enter it as a stranger, because the relations that have always existed between the Canadian Society of Civil

Engineers and your Society have ever been so cordial that I felt at once that I was coming among friends.

I may say too that the troubles that confront the American Society of Civil Engineers and the Canadian Society are very similar. Both of us have the same troubles in navigational facilities to solve; the question of terminals that is agitating you is a question that is very much alive with us; the question of providing facilities for the transport to the Pacific and to the Atlantic of the immense resources of both countries is similar with both of us; and therefore whatever affects one society will affect the other.

I am glad to have the opportunity, as one of the much too few representatives of the British Empire, to bear testimony to the very great work that has been done by this Twelfth Congress in its sitting at Philadelphia, and I think that the greatest work that is done by such a Congress is, not possibly the mere academic work of reading and discussing the papers, but it is the opportunity that is given to the members from the different countries of the earth to come together to compare notes, to get to know one another better, to get to love one another better, and to find out by familiar conversation in what way the practice of each country can be bettered in the other countries.

Words fail me to express my appreciation of the way in which this congress has been received in the United States of America during this trip. Our progress has been one triumphal procession, and it would be invidious to make any comparison,—from the President of the United States down to the officials of the several States and the several Cities that we have visited.

We have had the most magnificent reception, and I want on behalf of Canada, to lay my tribute of thanks and gratitude before the residents of the United States for the way in which we have been received. (*Loud applause.*)

Mr. John A. Ockerson (in English) :

In the year 1900 many members of our Society had the pleasure of visiting France, and were there most cordially received, but that is characteristic of that country and its people at all times. The Congress of Navigation held at Paris in that year was certainly most satisfactory in every particular.

We are glad to have with us to-night Mr. Andre Chargueraud, Counselor of State, Director of Roads and Navigation in the Ministry of Public Works of France, whom I take pleasure in introducing.

Mr. **Chargueraud** thanked the American Society of Engineers in French for the amiable welcome which had been vouchsafed to the members of the Congress, and for the charming hospitality which had been offered to them. He felt particularly indebted to its President, with whom he had

the pleasure of spending a few agreeable moments some days ago, for not having warned him—as was done in the case of some of his colleagues—that speeches would be made at this meeting, for he would have felt under an obligation to prepare one, and to seek a technical subject for his thesis. The majestic and severe appearance of the hall led him to think just now that such should be the trend of his remarks, but he did not think that the numerous and gracious ladies who were seated before him had come here to listen to discourses of this kind. He would, therefore, not detain them any longer from the other items on the programme. He then concluded by again expressing his warmest thanks to American civil engineers.

Mr. Chargueraud's speech was loudly applauded.

Mr. **John A. Ockerson** (in English) :

We have with us also this evening, a gentleman from Belgium, who has been an active participant in the Congresses of Navigation, and I have the pleasure of introducing Mr. Van der Linden, Inspecteur Général des Ponts et Chaussées.

Mr. **Van der Linden** (in French) :

Ladies and Gentlemen,

We are, at the close of the Congress, gathered together in the rooms of the powerful American Society of Civil Engineers, which has been good enough to invite us this evening to this brilliant reception.

I wish, in the first place, to address my warmest congratulations to its Honorable President, Mr. Ockerson, not only for this cordial reception, but also for the marvellous organization of this Congress at Philadelphia, to which the American Society of Civil Engineers has contributed so largely.

I will not speak of the actual work of the Congress. You have all had the opportunity of appreciating its importance. But it is impossible for me to avoid a reference to the beautiful excursions which have arisen from it, and amongst which I may mention the excursion of Trenton, of the Delaware, of Port Philadelphia, of Atlantic City (where we were treated to a delicious rest on the fringe of the ocean), of Washington, Harrisburg and Pittsburgh.

During these excursions we have had the good fortune of visiting the plants of gigantic industrial works, amongst which I may mention the Ambridge and Westinghouse works, which employ no less than 10,000 to 15,000 workmen.

We have also been privileged to see how American manufacturers—and above all, their engineers—are unrivalled organizers.

The onerous task of opening up the wealth of the immense territory of the new world has devolved upon a select few.

In principle this was inevitable, and indeed it was almost their sole preoccupation.

But then what a success! We have it here before our eyes; complete and grandiose. This we must all admit.

But when their first necessities had been acquired other requirements arose, and the people of America realized that a nation is *only* really great when it encourages and protects art and science. Here again their efforts have been crowned with success. The success has been complete, thanks to the logical mind and great generosity of the American people.

Whilst I say this, a thought crosses my mind. Twenty nations have met here and their delegates are far or near from their Fatherland. We are all influenced by our origin and by the environment in which we have been raised, and yet we feel that we are here present in an atmosphere of peace and good-will, and our sympathetic surroundings impress us, almost unconsciously, with a feeling that men were made to love one another. If, one day the horrors of war disappear from the surface of the globe, hydraulic engineers may justly claim the credit of a share in this magnificent consummation.

I conclude, Ladies and Gentlemen, by saluting most cordially this great and noble American Nation, and by wishing it an ever increasing prosperity. I form wishes for the continued development of Art and Science in this admirable country, where, in addition to the opportunity of acquiring unbounded wealth, the citizens also have the opportunity of devoting themselves without hindrance to the poor, to the humble, and to the unfortunate. (*Loud applause.*)

Mr. John A. Ockerson (in English) :

We have with us to-night a gentleman who registers from Haarlem, but this Haarlem is on the other side of the ocean in the Netherlands. I have pleasure in introducing Mr. Reigersman, chief engineer from Haarlem.

Mr. Reigersman (in English) :

Mr. Chairman, Ladies and Gentlemen,

It is with some hesitation that I take to-night the opportunity to speak some words to you in English as delegate of the Netherland's Government, but in the first place as delegate of the Royal Institute of Engineers of Holland. The American Society of Civil Engineers has more than three times the number of members of the Netherlands Society, which numbers among its eighteen hundred members not only the civil engineers but also the mechanical and the electrical engineers. So your society is a great one

in comparison with ours; but nevertheless both have always been on very good terms, and in close communication together; and moreover, your society has always shown to the members of ours, who have crossed the Atlantic, the best American hospitality such as we are enjoying here just now, and for which I wish to express my hearty thanks.

Today, a fortnight, we landed in America, and in those few days, we have found many contrasts with our country, but also many resemblances. Of the contrasts I shall not say much, only that you have so great and we have so small a country to live in, but as to similarities, we find out that you have still many names that we have, which may bring to you a reminder that in the early days New York was called New Amsterdam.

There are many things that we have the same, for instance, you love your country as extremely as we do ours; and you too have the red, white and blue as colours in your flag. The red means the blood that was shed to make you the people you are to-day. The white is the colour of peace; and from the President of the United States himself we know that you love peace, and happily you are mighty enough to maintain it, if necessary. Blue is the colour of truth, she being true to your country and to your flag; and the whole flag, with the forty-eight bright stars in it, is the flag of a free people living in a beautiful country that is so correctly called the land of the free and the home of the brave. (*Loud applause.*)

Mr. John A. Ockerson (in English) :

I am very glad that we have here with us tonight a gentleman who did so much to make the Congress of Navigation a great success, and I take pleasure in calling upon Mr. Luiggi to address you.

Mr. Luiggi (in English) :

Mr. President, ladies and gentlemen,

My eminent colleagues, who have spoken before me have, if I may say so, cut the ground from under my feet, so that I have very little to say after the beautiful speeches that they have pronounced, and which you have so kindly applauded.

As the delegate of Italy, I shall limit myself to wishing you the most heartfelt cordial wishes of the Italian Engineers, of the engineers who are making that land of art and song also a land of progress.

I bring you also the salute of Rome, the town of romance and of history. To American hearts I know Rome is very dear. I can admire your countrymen when they come to Rome, to see our old monuments, how they enjoy, how they appreciate, how they have studied all those monuments; they know them by heart, better perhaps than many Italians, which shows the great affection that America has for our old town of Rome.

For us engineers of Rome, there is also some charm, some attraction in this, that if I am not mistaken, it was the Romans who first built the arch, that instrument of construction without which nowadays I do not know how we should manage, if we had not learned before how to build an arch, and the Romans had such a great admiration for the man who could build an arch and build a bridge upon it, that they called him a Pontifex a man who made bridges; and they called him Pontifex Maximus, what we would call the chief, the man who built bridges.

This takes me a bit far away from our usual lines, but if we look nowadays how we apply the name of Pontifex maximus, it is very far away from how they applied it to the Romans; it is simply to build bridges, so all of us I should say, who have built some bridges, all of us are certainly Pontifex, and many would be Pontifex Maximus because they have built bold and costly bridges.

I have admired some of those bridges from my heart, and especially lately in Philadelphia I have seen the Walnut Lane Bridge. They told me it is a bridge of 250 feet span.

We have at Morbegno in Italy built a bridge of 225 feet span which up to a few years ago we thought was the largest masonry bridge in the world, even larger than the bridges that the English had built in England, the Bridge of Dee of 200 feet span. Since then we have built the Luxemburg bridge of about 85 metres span and the Plauen bridge of 90 metres span and recently on the Tiber in Rome we have built an arch bridge of 100 metres span but the bridge is in reinforced concrete and therefore, not strictly a masonry bridge. But the bridge at Philadelphia to which I have just alluded is nevertheless a bold engineering work. But the Walnut Lane Bridge in Philadelphia is 250 feet span.

But I will not intrude too much upon your time. I will speak of navigation. I was struck to-day in coming from Philadelphia to New York by the plan of what they call the Intracoastal Canal, the canal that will solve all the difficulties of the coastwise traveling, by avoiding the passage in the open Atlantic, the storms and the fogs, and substituting instead an inland navigation going coast wise inland, by using properly in their parts in the long reach the entrance to the Port of New York, the Delaware, the Chesapeake, and so you will have a line of inland navigation going from Boston down to the extreme south of the Atlantic coast, which will be of immense benefit for the ports and industries of your country.

We saw today on paper the main part of this canal from New York to Philadelphia. My best wish is that we shall see soon at some early opportunity the navigation of this first part of the line, and be all able to navigate this canal on a ship drawing 24 feet of water, going from the port of New York to Philadelphia, passing to Baltimore, going down South,—which will make the proper link between your important points of the north and that magnificent work that you are finishing just now in the extreme south, the Panama Canal.

I propose that we express our best wishes for the quick realization of this magnificent passage, which will complete the Panama Canal. (*Loud applause.*)

Mr. **John A. Ockerson** (in English) :

In closing, permit me on behalf of the American Society of Civil Engineers to wish you all a most delightful and profitable sojourn in this country, and when your visit is concluded, a safe and pleasant journey to your several homes, bearing with you pleasant recollections of your stay in America.

After these speeches Mr. **Charles Warren Hunt**, Secretary of the Society, made certain announcements in regard to the programme for the following day. Refreshments were then served in the other room, and members of the Congress remained in conversation with their amiable American colleagues until a late hour in the evening.



Municipal Ferry boat "Bronx", City of New York.

The day of the 4th of June was devoted to visiting the port of New York by boat. The City of New York, through the intermediary of its Mayor, Mr. **William J. Gaynor**, and of Mr. **William A. Prendergast**, Comptroller, and Mr. **John Purey Mitchell**, President of the Board of Aldermen, through the Board of Estimate and Apportionment, authorized the Dock Commissioners to conduct the delegates and Members of the XIIth Navigation Congress on an inspection trip of New York Harbor, on one of the Municipal ferry boats; and made an appropriation for their entertainment on this occasion. The Municipal ferry boat "Bronx" which is regularly assigned to the express service between the Battery, Manhattan, and St. George, Staten Island, was detailed by the Dock Commissioners, for the entertainment of the Members. It carried about 800 guests, including officials of the City of New York, representatives and Committees of the commercial organizations of the city, representatives of the various engineering societies; and other prominent citizens.

The "Bronx" left Whitehall terminal at the Battery shortly after 10 a. m. and proceeded down the upper bay between Governor's Island and the Statue of Liberty, to St. George, Staten Island; passing the Municipal ferry terminal, the terminal of the American Dock and Trust Company, Tompkinsville, Stapleton, Quarantine and Fort Wadsworth, which is at the westerly point of the narrows. The narrows were crossed from Fort Wadsworth to Fort Hamilton, after which the steamer proceeded up the Brooklyn shore of the upper bay, passing the Bush terminal, the new piers which the city has just built and is proposing to use, as the nucleus of a great freight terminal organization, past the Erie basin district, to Buttermilk channel, which lies between Governor's Island and the Borough of Brooklyn; thence up the East River, past the terminal of the New York Dock Company, and under the Brooklyn, Manhattan, Williamsburg, and Queensboro bridges, as far as the entrance to Hell Gate. Other points of interest observed were the Jay Street terminal, the East district terminal, and other private improvements.

At Hell Gate the "Bronx" passed around the north end of Blackwells Island, and proceeded down the East River near the

Manhattan shore, passing the great private and public developments which have been accomplished on the East River.



New York from the Harbor.

During the trip up the East River a speech of welcome was made by the Hon. **Calvin Tompkins**, Commissioner of Docks of the city of New York, who expressed an appreciation of the occasion, and briefly outlined the efforts that were being made to organize the entire Port of New York along modern and scientific lines. Colonel E. E. W. T. Russell, Corps of Engineers, U. S. Army, Senior Member of the New York Harbor Line Board, spoke of the improvements contemplated by the U. S. Government in the East River as well as in the Harbor in general. State engineer John A. Bensel spoke on the value of the canal systems which are being successfully planned and constructed, and Congressman E. K. Kinkead spoke on the development of the port, involving the portions situated in the State of New Jersey, as well as that in the proposed intracoastal canal. Luncheon was served during the trip down the East River.

A landing was made at one o'clock at the Whitehall terminal, to permit those wishing to leave the boat to do so; likewise affording an opportunity for additional guests to come aboard. The "Bronx" then left the Battery for the North River. The party steamed up the North River, near the Manhattan side, passing



City Piers at 31st and 33d sts., Brooklyn.

Battery Park, the railroad terminal piers on the North River, and the new trans-Atlantic piers known as the Chelsea piers, between West Twelfth and West Twenty-third Street, which is the principal terminus of the great trans-Atlantic service. Proceeding north



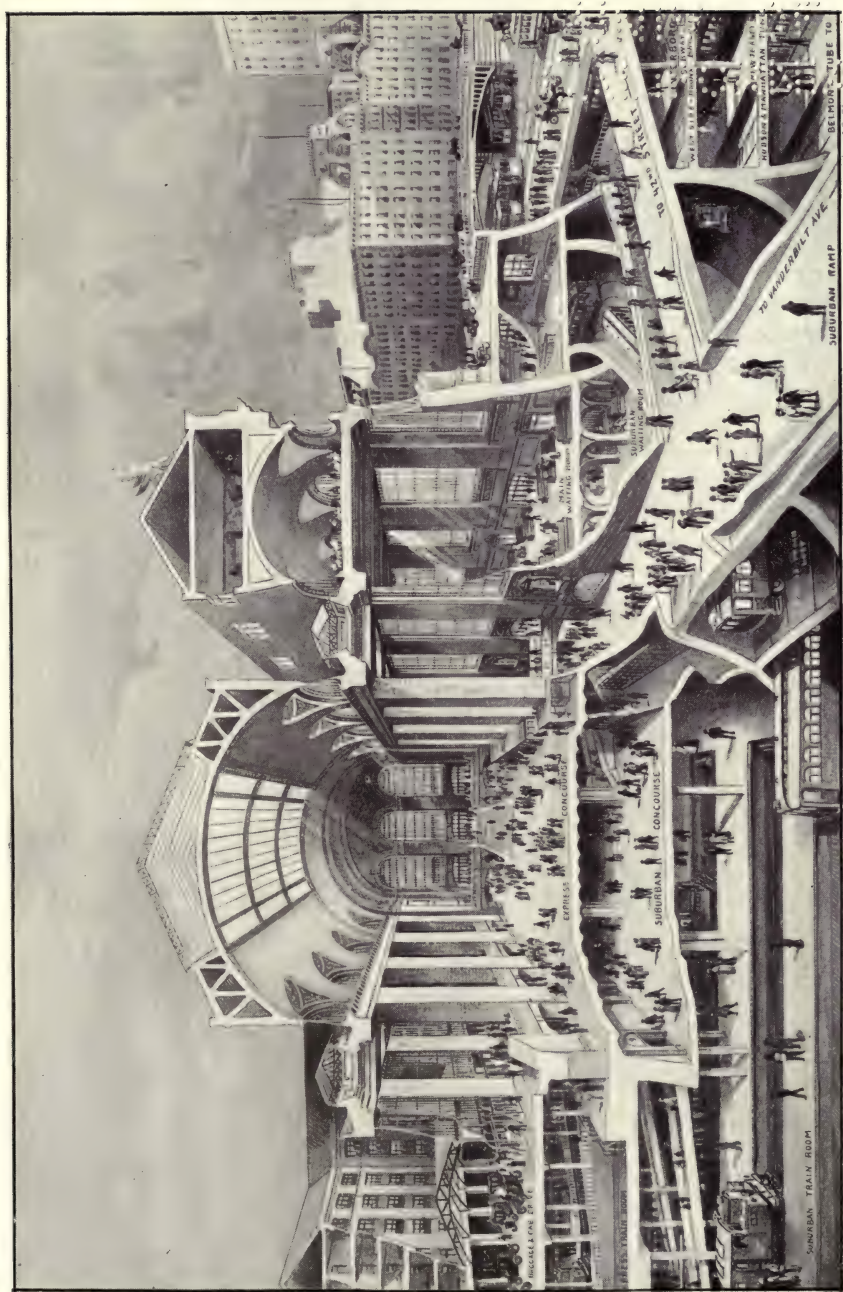
View of "Chelsea Wharves" from the River, New York.

from this point, the "Bronx" steamed past the pier developments north of the Chelsea piers, thence along Riverside Drive, passing the Soldiers and Sailors Monument, Grant's Tomb, and Claremont Inn, and proceeding north until beyond the limits of the city of New York. The boat then turned and passed down the river, along the New Jersey side, affording a good view of the "Palisades;" thence southerly past the terminals of the great German trans-Atlantic passenger lines; the tide water terminals of the railroads, leading to the west and south, and the immigrant station at Ellis Islands to the Battery, arriving there about four o'clock in the afternoon. Many members of the Congress here went aboard the steamer *Commonwealth* en route for Boston.

For those members of the Congress who remained at New York, the programme for the next day, the 5th June, included first of all a visit to the works of the Grand Central Station of the New York, New Haven, and Hudson River Railroad.

About 75 Members took part in this interesting excursion and were received through the courtesy of Messrs. **George W. Kittredge** and **George A. Harwood**, both chief engineers of the Railroad Company, and members of the American Society of Civil Engineers. They were also met by representatives of the Engineering Department, and conducted through this interesting and enormous work under construction. The work of the New Central Station was commenced in 1903, and most of it is actually finished. The improvement extends from Forty-Third Street to Fifty-Seventh Street, and includes the removal of about 3 million cubic yards of excavation, the laying out of about 350,000 cubic yards of masonry, and the erection of about 120,000 tons of steel.

The members of the Congress gathered together at midday in one of the rooms of the Manhattan Hotel, to partake of the luncheon offered to them by the American Society of Civil Engineers. Mr. **Charles Warren Hunt**, Secretary of the Society, presided in the absence of Mr. Ockerson. The luncheon, which was much enjoyed, was attended also by a considerable number of American Engineers, and the greatest cordiality obtained between them and their foreign colleagues. Several of the latter, presented in rotation by Mr. Hunt, delivered brief addresses to thank the Society for its hospitality.



SECTIONAL VIEW OF NEW YORK CENTRAL TERMINAL WHEN COMPLETED

Mr. de Hoerschelmann, delegate from Russia, was the first to speak as follows.

Mr. de Hoerschelmann (in French) :

Mr. President, Ladies and Gentlemen, and Honorable Colleagues :

When one comes to the United States, the first thing that strikes one is the large scale on which everything is done. This large scale is, however, traditional, and goes back to prehistoric times, as we have noticed when we admired, a few days ago, the formidable skeletons of antediluvian animals which are exhibited in the Pittsburgh Museum. This large scale was confirmed the day before yesterday when we visited part of a district where a great canal is about to be built which, when it is completely finished, will be ten times as long as the route of our great canal of the Lake of Ladoga in Russia. This large scale was again reproduced before us when we inspected the vast laboratories of the great citizen-electrician of the United States, and it was manifested again yesterday in the incomparable harbour of the city of New York, and this morning again, in this majestic palatial station which we have just visited. Here again we realize the grandeur of everything in this country, in the presence of this important Society of American Civil Engineers; which is great not only in the number of its members, (a number in which the usual hundreds are replaced by thousands), but also by the great works of its distinguished members. I raise my glass to the ever growing prosperity of this Society of American Civil Engineers!

These remarks were very much applauded, and the speaker was followed by Mr. Hervy-Cousin, delegate from Belgium, who addressed the assembly in French in the following terms:—

Mr. Hervy-Cousin (in French) :

Ladies and Gentlemen,

There is a Latin proverb which says : "Ubi bene, ibi patria".

If this old dictum is true we are on the way to become American citizens, as we are feasted and spoilt here in this Republic, which is the royal country for work, where we are treated like kings.

After the sumptuous festivities of Philadelphia and the instructive and useful excursions of Pittsburgh, we find ourselves the guests of the American Society of Civil Engineers. None of us can ever forget the magnificent and cordial reception which was offered to us the day before yesterday, nor the beautiful and interesting excursion yesterday to that thriving hive,

the port of New York. And whilst we were learning all we could from the genius of the enlightened American people, our wives were being entertained and cared for everywhere by the Ladies Committee with a kindness and generosity which have gone to our very hearts.

Yes truly, during the fifteen days we have been in America we have learnt to appreciate how good it is to live under your Star-Spangled Banner.

But let no patriotic person here present take umbrage at my remarks. If we Belgians are so happy here it is because we find great affinities in this country with our own.

I do not think I shall be accused of being a Jingo, or of unduly boasting about Belgium, when I say that it is a country of work and of liberty; and where shall we find throughout the world, I ask you, greater workers and freer citizens than the American people?

Once again I thank you, members of the American Society of Civil Engineers. I thank you on behalf of all the Belgians who have been treated so kindly by you, and especially on behalf of our Belgian ladies; since it is well understood that they are the most numerous section of the lady members.

Ladies and Gentlemen, I ask you here to acclaim the Republic of the United States; the country of Work and of Liberty!

The last words of Mr. Hervy-Cousin were received with loud applause, and he was followed by Lieutenant-Colonel Yorke, the British delegate, who spoke as follows in English.

Lieutenant-Colonel **Yorke** (in English) :

Mr. Chairman and Gentlemen,

I am honored by your invitation to address this distinguished assembly of railway engineers and officers. I had no idea that I should be called upon to speak and I have no notes to assist me. I shall therefore make my remarks as brief as possible.

I desire to thank you for your hospitality and also for the opportunity afforded to us all this morning of seeing the great engineering works connected with the rebuilding of the Grand Central Terminal Station ;—a Station which will not only be a model of all that a railway terminus should be, but also an ornament to The City of New York from an architectural point of view.

I remember when I first came to New York ten years ago, the officers of the New York Central Railway shewed me with pride the building which lately stood upon this site, and which was then supposed to embody all the best and latest ideas of railway station construction. That fine building has been swept away, and a still more beautiful and more commodious structure is rising in its place. I hope the life of this new palatial erection

will be longer than that of its predecessor. Judging from the solidity of its construction and the engineering skill which is being expended upon it, it should endure for all time.

But much as I admire the size and grandeur of the works and buildings erected in the United States, I admire still more the boldness with which American engineers face the gigantic problems they have to tackle, and the self-reliance and enthusiasm with which every one from the highest to the lowest carries out his share of the work before him. This is not my first visit to America and I sincerely hope it will not be my last. For in no part of the world and at no time of my life, have I ever enjoyed myself so much or learnt so much, as when I have been in this country. Once more, Gentlemen, I thank you.

Colonel Yorke was loudly applauded, and was followed by Professor Luiggi, Delegate from Italy, who spoke as follows in English :

Professor **Luiggi** (in English) :

As delegate of the Italian Government, in the name of my colleagues from the land of arts, of music and memories, and also in my own name—as a member of the American Society of Civil Engineers—allow me to express you all the sentiments of our gratitude towards the President, the Council, the Secretary and all the Colleagues of the American Society of Civil Engineers for the most cordial welcome we have received on our arrival in this wonderful city of New York, where every thing is colossal—even your most kind hospitality.

Since we landed on american soil, we feel as being in a sort of fairy-land—and I might say—in a sort of dream. We knew by fame the splendid victories of engineering which you had won over the forces of Nature, the great Croton dams and its rivals, designed on gravity lines, and the new Roosevelt, Pathfinder and Shoshone dams, designed on elastic theories of masonry, were familiar to us : just as were familiar to us, by fame, the extensive irrigation canals of your semi-arid zones, the Chicago drainage canal, the New-York State Barge Canal and that triumph of engineering skill : the Panama Canal ! We were also acquainted with the marvellous tunnels you have bored under the East River and the Hudson; with the bold bridges so successfully built across these waters and we had a vague idea of your tall buildings, of your stately railway terminals and other public constructions as waterworks, sewerage, gas and electric works, tramways and telephones. We knew by fame all these great undertakings and we had the greatest opinion of your engineering skill and resourcesfulness in the most difficult cases.

But our vision from afar was completely surpassed by our admiration for the reality we found here !

Inspecting, as we did, your busy harbor—teeming with shipping from all nations and from inland waters, and boasting of more than 300 Km. of frontage—running on your rapid transit subways; visiting your public parks, institutions and museums; and driving along the ample avenues of your beautiful cities, among those superb structures that emulate the Pyramids and the Colosseum, or the Cathedrals of the Middle Ages, we understood then the reason American engineers are so proud—and with just reason—of their achievements in engineering.

The reality of what we saw from Philadelphia to Washington to Pittsburgh and to Trenton, of what we have admired during these last days in your charming city of New York—that together with London is at the head of all the cities of the world—has surpassed all our most sanguine expectations.

A drive along the Hudson, along that beautiful Riverside Park, lined with lovely mansions and colossal “sky scrapers”, so tall and yet so majestic in their “ensemble”—and all this picture set so artistically in a beautiful frame formed by the central Park on one side and the Hudson and the far away Palisades on the other—makes one feel that your achievements in Engineering and Architecture have reached a level so high for grandiosity and exquisite beauty, to compare with any of the wondrous structures that history tells us were the pride of past ages, and of which we still admire the grandiose remains.

But allow me also to say that there is still something that surpasses the technical marvels we have to admire since we are among you; and it is your great kindness and exquisite hospitality.

Since we live on American soil and among American engineers, we feel that we are not only the Members of that universal Brotherhood which unites engineers all over the world in an unwritten law of good will and mutual help; we feel that we are among old friends, and that your cordial hospitality is like that given to dear brothers, when they come back from a long journey.

This is what strikes us and makes us feel so grateful to you.

We met in the days past, and we meet here today leaders of engineers that give us their valuable time, that show us cordially their methods of construction; that tell us freely the results of their experience in dealing with problems of the greatest difficulty but solved with perfect success. And for this initiation in the mysteries of your art, which we appreciate so cordially, please accept our most heartfelt thanks.

We thank you, one and all; you, Mr. Ockerson, who have given us such a friendly reception at the American Society of Civil Engineers; and who, with the help of your excellent Representative, Mr. C. C. Hunt, offer us today in the name of the Society you preside this pleasant meeting here; we thank you Messrs Ch. Harwood, Alf. Cramer, Sel. Deyo and Geo. H. Pegram for having conducted us so kindly over your important works for the N. Y. C. Terminal and the interboro' Railway and you Messrs. Calvin

Tomkins and Chas. Staniford for all the informations and plans you gave us about the docks and ferries and the harbor of New York.

I assure you, in the name of all present here, that we shall bring back to our homes the most pleasant recollections of our visit to the United States of America, of a country where we learnt some most important object lessons in engineering, especially devoted to the progress of maritime and inland navigation; of a country where we have met such clever engineers and such charming colleagues.

To the American Society of Civil Engineers, to all our colleagues who on American soil have been so kind to us, let us offer our most heartfelt thanks! May they win new laurels in all their future undertakings; may they live long and enjoy the blessings that their skill and perseverance has bestowed upon this land, by directing the forces of Nature for the benefit of mankind!

I propose a toast to all American engineers! (*Loud applause.*)

After the speech of Professor **Luiggi**, which was frequently applauded, Mr. **de Thierry**, delegate from Germany, and Captain **Matsumura**, delegate from Japan, briefly thanked the American Society of Civil Engineers for the kind hospitality which had been vouchsafed to them ever since their arrival in New York. These remarks were loudly cheered.

Mr. **C. W. Hunt**, Secretary of the Society, spoke once more for the last time, after the foreign speakers had finished, and expressed the honor and pleasure which the American Engineers had felt at receiving their colleagues who had come from all quarters of the globe.

On leaving the Manhattan Hotel, the party proceeded by the subway (Metropolitan Railway) to the Nevins Street Station, Brooklyn. Through the courtesy of Mr. **Alfred Craven**, Member of the American Society of Civil Engineers, Chief Engineer of the Public Service Commission, and of Mr. **William Bradley** of the **E. E. Smith** Contracting Company, they were conducted through a portion of the Fourth Avenue Subway work, now in process of construction.

This visit interested many members of the Congress, who inspected completed stations, a wide excavation, carried to a depth of 16 feet below mean high water, the under-pinning of large buildings, the support of the elevated railroad structure, and a crossing under the existing subway.

This concluded the official part of the entertainment at New York. The entire programme had been offered by the American Society of Civil Engineers, with the co-operation of the City Government.

Especial credit is due to the three gentlemen, Rear-Admiral **Mordecai T. Endicott**, Mr. **Horace Loomis**, and Mr. **Charles Warren Hunt**, who were appointed by the Society as a Committee of arrangement, to receive and entertain Members of the Congress. They devoted themselves to render the sojourn of the foreign visitors in New York exceedingly agreeable. It is therefore reasonable to believe that a new and strong bond of sympathy has been formed between the latter and their American colleagues.

Alternative Trip to Cape Cod Canal and Boston.

This trip took place on June 4th at the close of the New York harbor trip of that day. The members, numbering about 90, who had decided to visit the Cape Cod Canal and Boston, boarded the steamer "Commonwealth," of the Fall River Line, at the pier of this Line, foot of Warren Street, North River, New York.

This trip, as far as and including the Cape Cod Canal, had been generously offered by Mr. August Belmont, President of the Cape Cod Construction Co. The excellent detailed arrangements for the trip had been made by Commodore J. W. Miller, Vice-President of the Company. The steamer "Commonwealth," which is the largest and finest steamer of the Fall River Line, with a capacity of about 2,000 passengers, left her wharf at 5.30 p. m. The route taken, which is that ordinarily followed by the steamers of this line, is down the North, or Hudson River, to the Battery at New York, thence up the East River to Long Island Sound, then through the entire length of Long Island Sound, then for about 30 miles in the Atlantic Ocean to the mouth of Narragansett Bay, and through Narragansett Bay to the upper end of its northeasterly arm, called Mount Hope Bay, where the city of Fall River, Mass., one of the principal cotton manufacturing cities in the United States, is situated. Fine views were obtained of the New York city water front and of the country houses along the eastern half of East River, a strait connecting New York Bay with Long Island Sound.



STEAMER "COMMONWEALTH", FALL RIVER LINE

TO: HIND
MARCH 1943

An excellent dinner was served on board. During the dinner Commodore **Miller** gave notices relating to the excursion, and introduced Captain **W. H. Jaques**, Chairman of the Boston Local Commission, who said (in English) :

Ladies and Gentlemen,

On behalf of His Excellency, the Governor of the Commonwealth of Massachusetts, and His Honor, the Mayor of the City of Boston, I have the honor to welcome you to the Commonwealth and City to give you their formal invitations.

It is my further privilege to hand you a souvenir booklet of the City of Boston prepared for your information, a programme of the entertainment arranged for you and cards indicating your hotel accommodations, automobile transportation and luggage equipment.

The ladies of Boston have planned a most interesting and instructive series of excursions and I know all will join me in regretting that more wives and daughters could not find it convenient to visit our Commonwealth.

After you have completed the very hospitable and interesting programme which our host, Mr. Belmont, has so thoughtfully and generously prepared, you are to be the guests of the Institutions represented by the members of the Boston Local Commission until you join the main party at Albany. On their behalf and personally as Chairman I give you hearty welcome.

After Captain Jaques, who was much applauded at the conclusion of his speech, Mr. Belmont again rose to give a very interesting exposition of the features of the Cape Cod Canal, and pointed out the reasons which had led to its construction being decided upon. Mr. **Belmont** spoke as follows, in English :

The construction of the Canal was begun on June 22, 1909 by a private company. The line crosses the peninsula of Cape Cod at its narrowest point, the distance from shore to shore being only 8 miles, and from the 30 feet depth in Buzzards Bay to the same depth in Cape Cod Bay, 13 miles. By this short canal the water distance from New York to Boston is shortened by about 70 miles and vessels using the canal will avoid the dangers of the many submerged shoals lying southeast of the Cape Cod Peninsula (from 1843 to 1903 at least 2131 vessels were wrecked on or near these shoals, of which 908 were a total loss). The total tonnage now passing around Cape Cod is stated to be about 25,000,000 tons annually. The matter to be excavated is sand, clay and boulders, the total amount being about 17,000,000 cubic yards. The highest point on the line being about

29 feet above mean sea level, the canal is being constructed as a sea-level canal and without locks. Its depth is to be 25 feet at low water, bottom width in the land section 100 feet and in the approaches 250 to 300 feet. A granite rip rap jetty 3,000 feet in length has been constructed on the north side of the entrance in Cape Cod Bay. The bridges are to be of the bascule type, the length of span being 160 feet. The estimated cost of the canal is \$12,000,000.

The "Commonwealth" arrived at Fall River on the following day, June 5th, at about 6 a. m. After breakfast, which was served on board at that place, the members of the Congress left by special



Dredge working on Cape Cod Canal.

train for the Cape Cod Canal. A stop was made at Buzzards' Bay Station, near the western terminus of the proposed Canal, which enabled the visitors to inspect the work in the Monument river by which the Canal enters Buzzards' Bay. An opportunity was also afforded of examining the bascule bridge, on the New York, New Haven and Hartford Railway, and of seeing this interesting structure in operation.

After several other stops along various points of the Canal route, the train arrived at Sagamore which is about three miles

from the eastern end of the Canal. At this point the party was taken on by boats through the completed portion of the Canal to Cape Cod Bay to examine the breakwater which protects the eastern entrance. On returning to Sagamore the dredgers which were at work just above that point were also visited by the party. The train was then taken as far as Sandwich, the head-quarters



R.R. Bascule Bridge, Buzzards' Bay.



Dredge working on Cape Code Canal.

of the Canal Company. In the office of the Company, which is somewhat restricted in size for purposes other than those of an office, an excellent buffet luncheon was served, at which a number of the Sandwich ladies assisted. Immediately after this the party gathered on the large lawn connected with the office building, and were addressed by Mr. **Belmont** in English and in French as follows :

It affords me great pleasure to welcome the members of the XII International Congress to this spot. While the enterprise which I represent, may not in a general sense be international, yet its construction will, if properly done, and upon the lines which have been followed so successfully abroad, tend to the safer navigation of a coastline some three thousand miles long.

The earlier influences which impelled the first settlers of this region to suggest the channel, came with them from the countries where they had found a refuge before sailing for America; and now, you are here bringing the enthusiasm of a world-wide interest in the development of water transportation, giving us encouragement due to the problems which you have successfully solved in the lands of our forefathers.

My aim has been during this trip to make it informal, and without speeches; to entertain you in a social way; while incidentally, giving a general idea of our work. Perhaps today, in some small measure, I may have returned the many civilities received on various occasions when visit-

ing the countries from which you are accredited; trusting that you will have as pleasant a time after you leave us as that you have given me yesterday and today. (*Loud applause.*)

Mr. **de Timonoff**, acting President of the Association, then thanked Mr. Belmont (in French) in the following terms :

Mr. President of the Boston, Cape Cod and New York Canal Co., Ladies, Gentlemen, Members of the 12th International Navigation Congress,

Our honorable host, while he is an American, is a very distinguished and well-known Parisian, speaking the French language with the same ease and the same eloquence as his own. He will therefore excuse me if, in the interest of the majority of the members of our group of the 12th International Congress of Navigation, I permit myself to reply to his friendly address in French.

Since yesterday we have been the guests of the Boston, Cape Cod and New York Canal Co. and have enjoyed the splendid hospitality which this company and its eminent President are offering us. On board of a floating palace, bearing the glorious name of "Commonwealth", we left the city of New York, to navigate in a deep sea but perfectly sheltered by nature against the tempest and waves of the ocean. We are all of us still under the impression of that end of the day full of charm in which we have seen passing before our wondering eyes the imposing silhouettes of the buildings and bridges on the East River replaced then by verdant hills gradually lost in the twilight. A dinner, royal in its menu, and of an infinite charm of sociability, through the graciousness of the welcome of our amphytrion, accompanied by addresses on the Boston, Cape Cod and New York Canal, permitted us later to prepare ourselves for visiting the works of this Canal while refreshing ourselves and informing ourselves on the things which we were to see.

These works we have visited to-day. We have seen with what system and what perseverance the Boston, Cape Cod and New York Canal Co. is completing its great project of joining two bays of the ocean by a navigable way through the land, thus creating the first section of the immense waterway, maritime and interior at the same time, which is to join together the whole Atlantic coast of the United States. This inspection of the works, of the highest technical and economical interest, was ended by the gracious reception at the headquarters of the Company in the town of Sandwich, where, after an excellent luncheon, the Honorable President has addressed to us words of sympathy which will vibrate a long time in our ears.

Permit me then, in the name of the Permanent International Association of Congresses of Navigation, and of the various nations whose repre-

sentatives have enjoyed the hospitality of the Boston, Cape Cod and New York Canal Co., to address our sincere thanks to this Company and more especially to its President, Mr. August Belmont. (*Loud applause*).



Earthwork on Cape Cod Canal.

It was about two o'clock in the afternoon when the members of the Congress left Sandwich for Boston. A special train had been placed at their disposal for this journey by the Local Reception



Bourne Highway Bridge.

Commission of that town. The party arrived about 3.30 p. m. and immediately proceeded in automobiles to the Hotel Vendome, which was to be their headquarters while in that city. About thirty members of the Boston Local Commission and other representatives from Boston had met the party at Sandwich and accompanied them on the train and to the Hotel. During the remainder of the afternoon those of the party who desired were taken in automobiles to visit the Massachusetts Institute of Technology and other points of interest about the city.

Reception and Banquet at the Algonquin Club.

A reception and banquet, tendered by the Boston Chamber of Commerce in honor of the members of the Congress, took place at the Algonquin Club of Boston. The programme was exceedingly attractive and all the members made a point of attending. The reception, in some of the public rooms of the club, was followed by the banquet in the large hall of the club, which had been handsomely decorated with the flags of all nations.

At the same hour and in another room of the same club, a dinner was given to the ladies of the party by representative Boston ladies, at which Mrs. A. Lawrence Lowell, wife of the President of Harvard University, presided.

Mr. Joseph B. Russell, President of the Chamber of Commerce, presided at the men's banquet, at the close of which, in a short address, he welcomed the members to the City. He spoke particularly in regard to the great interest which the people of the Commonwealth and of the City are now taking in the development of the port of Boston, presenting the advantages of the port and predicting for it a great development in the future. He continued :

The Chamber of Commerce felt specially grateful that so many of the prominent members of the 12th International Congress of Navigation had accepted the invitation to visit Boston, and felt sure that their inspection of the port and the plans for improving it, with the views regarding these that they might express, would be of the greatest benefit.

He was followed by Adjutant General Gardner W. Pearson, who presented the regrets of Governor Foss that, owing to the serious illness of his father he could not personally welcome the visitors.

General **Pearson** added (in English) :

The Governor is most anxious to extend our trade by land and sea and in the development hopes to have the co-operation of the Chamber of Commerce. He thinks Boston is most fortunate in having at this time the presence of so many distinguished men experienced in this most valuable work, and hopes your stay will be greatly enjoyed.

The Honor. **John F. Fitzgerald**, Mayor of Boston, who followed, said (in English) :

I feel it a great honor and pleasure to extend to you the official greetings of the City of Boston.

I present to you the keys of Boston and the freedom of the City and I feel that her 700,000 population join in this greeting and welcome. (*Applause*).

Men have given much time and thought to the advancement of Boston. She is one of the first commercial centres in the country. She is nearer Europe than any other city. The day is dawning for the commercial development of Boston. If I had you in charge you would see a great deal of Boston. I hope you will see her schools, parks, colleges and all our interesting institutions.

You are the guests of no mean city. I trust you will enjoy the hospitality of the city and that you will all come to the International Congress of Commerce Clubs next September. (*Loud applause*).

Mr. **George S. Smith**, former President of the Chamber of Commerce, said (in English) :

I find myself impressed with the spirit shown by the men gathered at this board.

The feeling manifested here will prepare you for another grand event, the fifth International Congress of Chambers of Commerce of the world, which will take place this year.

We feel that there ought to be an international tribunal for the settlement of trade question. This is a problem that should appeal to all people. (*Applause*).

Several foreign delegates replied to these speeches. Mr. **de Timonoff**, Acting President of the Association, then spoke (in

English) as follows to thank the authorities of the State of Massachusetts and of the City of Boston for their kind welcome.

Mr. Chairman, Gentlemen,

I consider it a very great honor in having been invited to speak at the dinner given by the Boston Chamber of Commerce to the members of the Permanent International Association of Navigation, which I represented during the session at Philadelphia. This Association although formed for professional purposes, is to a certain extent, one of the powerful means which nations have created to increase their mutual esteem, strengthen their friendship, and contribute in a mighty way to the work of peace.

We practically exist as an International body since 1885 and many International Congresses have already been held in different countries in Europe, but we are for the first time in the United States. This country attracted us in a high degree because of the importance of its navigation and so many wonderful examples of American enterprising spirit and engineering skill in the line of construction of canals and harbors and improvement of rivers.

Among the cities we wish to visit during our stay in the United States the city of Boston is one of the most prominent, not only because of its glorious past, as the chief port for the trade of this country with Europe and Asia, but also because of the happy future which is reserved for this beautiful city as the result of the combined efforts of the Federal Government of the United States, of the Government of the State of Massachusetts, of the City Government itself, and of the Boston Chamber of Commerce. The members of our International Association know the excellent scheme of the improvement which is being made in the harbor of Boston where the Federal Government, with increasing success, works on the channel, the State Government makes great sacrifices of money for the dock, the City rebuilds continuously the bridges to suit the needs of navigation, and the Chamber of Commerce brings into close connection the work of numerous Associations interested in the prosperity of New England.

Thereupon the very kind invitation to visit Boston which was extended to us was very welcome and we accepted it enthusiastically.

Let me now on behalf of the Permanent International Association of Navigation Congresses express our deep thanks to the Commonwealth of Massachusetts and his Excellency Governor Foss, to the City of Boston and his Honor, Mayor Fitzgerald, to the Boston Chamber of Commerce and its President, Mr. Jos. B. Russell, to the Local Commission for the reception of the Navigation Congress, and its Chairman, Captain William Henry Jacques. (*Loud applause.*)

Mr. **de Timonoff** was followed by Mr. J. F. **Bubendey**, a German delegate, who spoke as follows (in German) :

Mr. Mayor, and Gentlemen,

Our travels in the eastern part of the United States have now lasted about 15 days, since the Twelfth International Navigation Congress was inaugurated at Philadelphia, and I may add that our travels have been a triumphal tour without interruption. But it is not those who have crossed the ocean or come from neighbouring lands who can be considered to be the heroes of this triumphal march. No! We must admit that it is we who have been the vanquished throughout, for we have been overcome by the demonstrations of affection showered so lavishly upon us by statesmen, including the chief magistrate of your country, President Taft, and by the Governors of the States, and the Mayors of the Cities we have visited. We have also been completely routed by the cordial co-operation we have encountered wherever we desired information, and we have been overcome by the sumptuous hospitality with which the members of the Congress and their ladies have been received by all American men and women.

We have learnt to thoroughly appreciate the eastern coast of the United States with its deep-set bays, which nature has so well adapted to the purposes of trans-shipping merchandise between vessels which connect continents together and to admire the splendid network of railways upon this vast continent. We have also seen how the inhabitants of the towns situated on these bays have been able to profit by an natural situation which is so favorable to commerce, and our presence in this great and beautiful city of Boston has enabled us to appreciate the maritime plant in this city, and also the steps which are now being taken by Boston to perfect the trans-shipment of merchandise between sea and rail by new ways of communication. Gentlemen, permit me in thanking you for the cordial reception of the city of Boston and its Chamber of Commerce, to express the wish that the undertakings which are now contemplated may lead to the achievement of still greater successes in the sphere of the world's commerce. (*Loud applause*).

Mr. **Bubendey** then continued in English :

Gentlemen, We return our sincerest thanks to the city of Boston and her Chamber of Commerce and we express with all our heart the desire, the City may further largely proceed in her great development.

Colonel **William P. Anderson**, a delegate of Canada, then spoke as follows in English :

I regret that Great Britain has not sent a larger delegation for there is much to be learned from this country.

The prosperity of a nation depends on its shipping and commerce. Boston is very favorably situated for development in the shipping line.

We are satisfied with the relations of Boston and Canada and with Boston and England. Boston ought to get a large amount of foreign trade while the opening of the Cape Cod Canal will help the coastwise trade to the south.

Mr. **André Charguéraud**, delegate of France, then rose and addressed the assembly as follows, in French :

Mr. President and Gentlemen,

Thanks, congratulations and good wishes! Such is the triple meaning which I would give to my words. But the French language, notwithstanding its wealth of expression, and above all my limitations as a speaker, do not enable me to do justice to the sentiments I experience at this moment. At all events, be assured that if words fail me, it is from the deepest recesses of my heart that I thank you most sincerely on behalf of the delegates of the French Government.

Pressed from various quarters with equal persuasiveness to visit the different parts of your beautiful country, and compelled to make a selection from alternate tempting itineraries, all the members of the French Delegation and our compatriots who are taking part in the Congress have chosen the programme which has led us here; and we congratulate ourselves most heartily on our selection.

We knew that we were going to visit a large port, and that we should find there a good deal to learn of paramount interest to engineers, and from this point of view our expectations have been realized. But in addition to this we have found a city of extreme intellectual culture where science, literature and art are held in esteem, and where every step seems to bear the impress of French tradition. Just now in passing before the magnificent building which is exclusively devoted to the teaching of Latin to young ladies, I thought that your city, like the poet, had the right to claim that nothing which is of interest to humanity at large is foreign to it. Immediately on my arrival I was struck by so many points of similarity which reminded me of my own country, and our meeting to-night is still yet another reminder. We are received by the Boston Chamber of Commerce, and when your engineers honored us by visiting our ports, — which are very modest compared to your own — they also were welcomed by our Chamber of Commerce. We have amongst us this evening the President of one of our French Chambers of Commerce, namely that of Boulogne-sur-Mer where important works are now being carried out. Boston is the second fishing port in the world, and Boulogne boasts of holding a very foremost place amongst fishing ports, and is also a port which contributes very largely the maintenance of communications with

the United States. I feel certain that Mr. Farjon will bear me out in the sentiments that I express.

Gentlemen, I congratulate you most heartily on your capacity for organizing. Mr. Belmont's hospitality had already given us a foretaste of what we might expect, and its consummation has been complete to-day and this evening.

Gentlemen, in drinking the health of the Chamber of Commerce may I express the wish that the superb city of Boston should pursue the path which it has so magnificently mapped out for itself, and that it shall continue to be in all things an example and an inspiration. (*Prolonged applause.*)

After this fine speech Mr. **Zoltan de Kohanyi**, delegate of Hungary, expressed his gratitude for having been privileged to be the guest of this magnificent city of Boston, which has played such a brilliant part in American history, in its literature and in the development of its industries.

Professor **C. K. Merozyng**, delegate of Russia, expressed in his turn, his interest in seeing this beautiful city of Boston, this cradle of liberty and residence of great statesmen and distinguished engineers, as follows :

Mr. Chairman, Ladies and Gentlemen,

Arriving at Boston, we have reached one of the finest and also oldest intellectual centres of the United States. Here was the cradle of American liberty but also of American science. Here was born Benjamin Franklin : and he was not only a statesman, but also one of the greatest scientists of the world. And the Boston people are always going in Franklin and Longfellow's steps. The brilliant Massachusetts Institute, Harvard University Museum, this all test this. And by the force of science the United States people have conquered not only independence, but also all land from the Atlantic to the Pacific coast. The science of American engineers has built the wonderful Pacific lines, crossing the continental divide : by the art and science of American engineers are built these marvellous harbors and bridges, that we have seen, and last but not least by the genius of Edison and his followers we see enormous hydro-electrical plants, giving for all people very cheap the benefits of electric energy. We are all sure, that this enormous progress will go on increasing for the benefit of all peoples.

Colonel **F. W. Hansen**, delegate of Sweden, then thanked the Mayor for his welcome, and for extending the freedom of the city.

He was followed by Dr. **Octavio Figueroa**, delegate of Argentina, who spoke in the same vein, and then by Professor **K. Emil Hilgard**, delegate of Switzerland, who remarked that in his country also great engineering problems relating to waterways, and especially to navigation on the Rhine, were the order of the day. The utilization of the water of the melting snows for the generation of electricity, to furnish light, power and heat, might also be the subject of interesting investigations and experiments in the near future.

Mr. **August Belmont** was one of the last speakers to respond to the toast of the Cape Cod Canal. He was loudly applauded, and after acknowledging the compliment said :

I am surprised that the State of Massachusetts or the United States did not undertake the building of the Cape Cod Canal for great benefits would result from the operation of this waterway.

While I have met with no encouragement in the undertaking, I am personally proud and glad that it is a private enterprise, for it will be the salvation of New England and the port of Boston.

The Mayor, Hon. **John F. Fitzgerald**, here said that he might congratulate Mr. Belmont on the great work he was doing, and might say that this was undoubtedly the most powerful aid to the development of the commerce of the Commonwealth that had yet been undertaken.

General **Hugh Bancroft**, Chairman of the Directors of the port of Boston, described what Boston had been as a sea port and stated its natural advantages over other American ports. He hoped that it would regain its past prestige, and continuing as follows said:

The presence of so many representatives of the great nations of Europe is very flattering to us. We find in the growth of your great ports both a lesson and an inspiration for us in our undertakings. We are very anxious to establish closer relations with the continent of Europe.

I am very glad to notice that the German Empire is represented by a large number of delegates, and I thank you for the interest which you show by your presence. I hope that this may forecast still more cordial relations between the German Empire and Boston.

We welcome the Italian delegates especially because Boston has long been a favourite for Italians coming to the United States.

In closing I want to call your attention to the coming Congress of International Chambers of Commerce which is to be held in Boston in September of this year, for these congresses attempt to bring nations together in good will.

These concluding remarks expressed in turn in English, German, French and Spanish, were loudly applauded.

This terminated a most interesting and enjoyable evening, which had been offered to the members of the Congress by the Boston Chamber of Commerce.

Boston Harbor Inspection Trip.

This trip was offered on June 6th by the city of Boston. At 10 a. m. the members of the Congress boarded a steamer belonging to the city which had been chartered for the excursion. On the boat printed descriptions of the trip, with an excellent map of the harbor, were furnished to the members.

After making a circuit of the inner harbor, passing the wharves of the various foreign steamship lines, United States Navy Yard at Charlestown and the water terminals of the railway companies, the steamer proceeded towards the outer harbor where the wharves of East and South Boston, including the piers constructed or under construction belonging to the Commonwealth, were seen. A complete circuit of the outer harbor was made, passing the numerous islands and the principal anchorages and giving an opportunity to observe the various entrances from the sea.

After luncheon, which was served on board, the steamer arrived at Quincy, Mass., in the Weymouth Fore River, one of the tributaries of the harbor, and landed at the wharf of the Fore River Shipbuilding Co. A stop was made here in order to permit of an inspection of this very large shipyard and of the vessels under construction there, which, through the courtesy of Admiral Francis T. Bowles, President of the Company, the members were able to see quite thoroughly. The steamer then returned to Eastern Avenue wharf, Boston.



« Mystic wharves », Boston and Maine R. R. Co., Boston.

Here automobiles were in waiting and the members were taken on an extensive trip through the residential district of Boston and through a portion of the park system of the city and of the Metropolitan Park Commission. Returning via Harvard University they were received at the home of Mr. Lowell, and obtained a good idea of what is in many respects the leading University in America.

Reception and informal dinner at the " Boston City Club „

The reception which took place at 6.00 p. m. was tendered by the Boston Society of Civil Engineers, the members of the Congress being presented to the President of the Club, Mr. James W. Rollins, and a large number of the other officers and members. The dinner which followed at 7.00 p. m. was given by the Boston City Club and later in the evening Mr. **David F. Tilley**, President of the Club, made a brief address of welcome. Mr. **James P. Munroe**, who acted as toastmaster then said (in French).

Gentlemen, it is my great regret not to be able to fluently speak French, German and the other languages of the distinguished members of the Twelfth International Navigation Congress who are our guests this evening. It is a reproach frequently made to Americans that they do not know any other language than their own. I am, however, not called upon to apologize for this here, as you all have the advantage from this point of view of understanding English perfectly. Allow me, however, to tell you in the diplomate tongue how we congratulate ourselves on having been connected with your imposing Congress, and of having been privileged to receive you amongst us. We give you a most hearty welcome. (*Applause.*)

We members of the City Club constitute, like yourselves, an entirely cosmopolitan association. In our rooms all races, all professions, all religions, all political parties are to be found. But we have all one thing in common which welds us together, and that is our love for the city of Boston and for the State of Massachusetts. And we know that the blood which vivifies the arteries of our city and of our State is commerce, which you, gentlemen, assist in developing by your science and knowledge. You call yourselves civil engineers, and this is above all an apt name, for you are and always will be the mainstay and the promoters of the true civilization. (*Loud applause.*)

Mr. **de Timonoff**, Acting President of the Association, then followed Mr. Munroe, and expressed himself as follows in English :—

Mr. Chairman, Gentlemen :

The science is international.

Every individual or corporation whose field of action is science works for all nations, works for humanity as a whole.

Scientific societies, being established in a given country to serve its special needs, to help its own people, are none the less institutions of international, or world importance. The results of their activities are spread over the whole world and serve the needs of other countries and help other people in their progressive march towards a better future.

The Boston Society of Civil Engineers is the oldest of its kind in America and one of the oldest in the world. Established in 1848, this society has already accomplished much for the development of technical science and its application. Still greater future is before it. The City Club of Boston is also a body which has included scientific investigation of technical problems in its program. The activity of this Club in the line of the improvement of the City of Boston has highly impressed the members of the International Association of Navigation Congresses.

The members of this Association are exceedingly pleased at being invited by the Boston Society of Civil Engineers and the Boston Club to this charming reception and dinner, an excellent opportunity being thus afforded to the members of our body to exchange their views and ideas with most distinguished engineers and scientists of New England.

It is, therefore, a most pleasureable duty for me to address on behalf of the Permanent International Association of Navigation Congresses, our heartfelt thanks to the Boston Society of Civil Engineers and its President, Mr. James W. Rollins, to the City Club of Boston, and its President, Mr. David F. Tilley, and to the Chairman of this dinner, Prof. James P. Munroe. (*Loud applause.*)

Mr. **Richard C. Maclaurin**, President of the Massachusetts Institute of Technology, then spoke after Mr. de Timonoff, to point out how peculiarly opportune was the visit of their distinguished guests to Boston. Continuing, he said :

The nation as a whole, and Boston in particular is turning its attention to the larger aspects of the navigation problem. It is no secret that America does not now occupy herself with questions of navigation so fully as might be expected from such a nation. It seems difficult for Boston to look both seaward and landward, but navigation is only an adjunct to

trade, and it is hoped that some turn in the wheel of fortune will force us once more upon the high seas. (*Applause.*)

Mr. **Cottlieb von Meijeren**, delegate of Germany, then addressed the meeting in the following words (in German):—

Gentlemen :

Just before leaving Boston allow me on behalf of the German delegates to the Twelfth International Navigation Congress, to express our cordial thanks to all those who received us so kindly yesterday and to-day; and especially to the members of the Society of Engineers, and the members of this hospitable Club. All we have been privileged to see in the way of commercial and industrial enterprise and extension of traffic during our fifteen day's sojourn in this important country, is considerable and awe-inspiring. My remarks apply particularly to this universal city of Boston with its famous scientific and technical Institutions, its technical enterprises and its great port. But what has surprised us above all is the vast extensions which are contemplated for this port.

Gentlemen, I have only one regret, and it is that the German members who have attended the Congress, (who number 70 in all), should be represented in such small numbers in Boston.

The American sun shines so fiercely upon us that our compatriots who come from more northern climes have not dared to face this excursion. And yet it is precisely during this excursion that we have been favoured by a sea breeze who has lowered the temperature to a refreshing degree. But if the weather is fresher, there is one thing, viz. our hearts, which has certainly not grown cooler with the warm welcome which has been showered upon us in all quarters.

Gentlemen, be assured that we shall always remember with pleasure our charming welcome and the agreeable hours we have spent amongst you. May the great and beautiful city of Boston always continue to grow and prosper. (*Loud applause.*)

Dr. **Octavio Figueroa**, delegate of Argentina, then spoke briefly in praise of Boston, and was followed by Mr. **Max Muhlen**, delegate of Belgium, who spoke as follows (in English):—

Mr. Toastmaster, Mr. President, Gentlemen,

Wednesday afternoon, when leaving New York aboard the steamer Commonwealth, starting on the journey to the great city of Boston, whilst passing under the tremendous bridges thrown over the East River, I paid a tribute of sincere admiration to the science and skill of the technical men

who created such wonderful works of art. Yesterday, during our interesting trip along the line of the Cape Cod Canal, were shown to us several important bridges, amongst which the railway bascule-bridge, crossing the Monument River is a real masterpiece. To-day again, we had the opportunity of seeing in this great city of Boston many remarkable bridges, proving that the Massachusetts engineers are equal, if not superior, to their other American colleagues. Surely, after this three-day trip of wonderful bridge scenery, I shall leave Boston with this conviction, and I dare say all my foreign colleagues will fully agree with me, that the United States are actually the leading country in the world for bridge engineering.

However, our American friends will have to acknowledge that all these bridges were not constructed intentionally for the XIIth Navigation Congress, and were all achieved long before we, foreign delegates and members, left our respective countries to gather in Philadelphia. But, on the other hand, since we foreigners reached the United States territory, many new bridges have been built by our colleagues the American engineers. Forty bridges or even more have been erected, during the last fortnight, between the United States and the numerous countries who have sent representatives to the XIIth Navigation Congress, bridges of friendship and reciprocal esteem. All these bridges were already strong before we came to Boston, but the Boston engineers, I am glad to say it to them, who are here this evening the guests of the Boston City Club with their brothers from abroad, the Boston engineers have still reinforced these structures of friendship by adding to them many steel bars and a considerable number of rivets. I address here to them all, my most heartfelt thanks. I can only wish that every one of these forty bridges will never show any sign of deterioration, nor need any repair. I also sincerely wish that under these bridges of friendship will ever flow deep and majestic streams, golden Pactoles, on which the maritime commerce of all countries will grow in a peaceful competition for the greatest benefit and wealth of all nations on earth. I thank you, gentlemen. (*Loud applause.*)

Mr. **V. E. Laknisky** delegate of Russia, then thanked the "Boston Society of Civil Engineers" and the "Boston City Club", as follows:—

Mr. President, Gentlemen of the Boston City Club and Members
of the Society of Civil Engineers of Boston,

In a couple of hours our party will leave this city and go further following the line of our extensive itinerary through the hospitable country of the United States. Before doing so, I should like to glance back on the portion of the trip already made up to the city of Boston.

It was quite natural on the part of our aimable hosts to include in the programme of your journey besides many places of engineering or technical importance, three points which I suppose you have already mentioned as points of broad interest, three most important centres of different activities of this young and ambitious country. I am sure Americans here present know very well to which parts of their continent I am referring now: these three places are the three great capitals of the United States each playing its own important part in the life of this country. We have had already the pleasure to visit all three of them. We have seen the monumental majestic and at the same time peaceful and simple in its beauty national Capitol of Washington, the home of Uncle Sam. We have just arrived yesterday from the second point—the rushing boiling and noisy business centre, the greater (or I should say the greatest) New York with its tremendous movement on streets, rivers, harbor waters, under ground, on water and in air, with her bold and marvellous engineering structures on a quite unusual scale—I will not enumerate here even the most striking features of this city, which attracted the attention of us, European engineers, it would take too long. And now—we are leaving the third of the three mentioned vital points—the scientific and spiritual capital of America, which is of no less importance than the first two in her political business and spiritual life.

Far away from here, in Europe, in Russia we knew about this prominent position of Boston and the credit this city deserves. The famous Harvard University, the Boston "Tech" are well known outside of the limits of this country as ranking with the best schools of the whole world.

And now to-day after the rides and inspection of this city we are only more convinced that we are right here in a place where science and teaching are the principal business. Instead of skyscrapers and extensive lines of Government buildings we have seen schools and scientific institutions. It is with a feeling of admiration of this scientific capital that I am glad to address here to our hosts the members of the City Club of Boston as the best citizens of this City on behalf of the Russian members and delegates, our sincere greeting, best wishes and hope, that Boston will always lead in the scientific and technical life of this country and be always as it is now, the pride of the United States before the eyes of all nations of the world.

Allow me, gentlemen, to address just a couple of words to the Boston Society of Civil Engineers, whose member we met just before stepping here and whom I have the pleasure to see here with us.

The other day in New York we were told by the President of the borough of Manhattan that the possibility of existence and the welfare of the City of New York are due to the work and skill of their engineers.

I guess I will not be mistaken if I say, that the welfare of this growing young country (not only of a city) is largely depending on these engineers and the civil ones particularly.

I am glad here before the members of a local Civil Engineers' Organization as belonging to the army of Civil Engineers of this Country to state how deeply we were impressed by American civil engineering which we have the chance to inspect all over the United States and I take the opportunity to extend to those engineers the best congratulations on behalf of their fellow Russian engineers for the marvellous achievement we have seen in this country.

Let me now in conclusion of my words extend on behalf of Russia our most cordial thanks to the local Society of Civil Engineers and its President Mr. Rollins, and to our amiable hosts the President and members of the Boston City Club for all the courtesy and hospitality extended to us and let me assure them that we will take back with us to Russia the most heartfelt and deep memories of the American Civil Engineers and the glorious scientific spiritual capital of the United States.

Several other speakers then spoke after the dinner in the following order:— Mr. **C. J. A. Reigersman**, of Holland; Mr. **Carlo Castiglione**, of Italy; Prof. **C. H. McLeod**, of Canada; Prof. **K. Emil Hilgard**, of Switzerland; Mr. **Ant. Brancher**, of France; Mr. **H. X. Boutteville**, of France; Mr. **Desmond Fitzgerald**, of the United States, and Dr. **E. L. Corthell**, of the United States.

They were all much applauded. We print below the speeches of two French delegates.

Mr. **A. Brancher**, spoke as follows:—

Mr. Chairman and Gentlemen,

It is owing to my being a veteran member of the Society of Civil Engineers of France that I have the honor of speaking before the Boston City Club, and for this I thank our eminent Acting President of the Congress, Mr. de Timonoff.

About twenty years ago, I accompanied a body of French civil engineers who came to America in connection with the Chicago Exhibition. My colleagues and I have preserved very agreeable recollections of the welcome which was extended by your Society to ours.

American hospitality is traditional, and I think it even exceeds Scotch hospitality. We have had the opportunity of testing it, and of appreciating it.

Is it because the port of Boston is the nearest port to those of our own French fatherland?

Is it also because your noble city is the city of culture, of literature, science and art?

Probably, for most certainly the alacrity which we have shown to visit the celebrated Harvard University and your technical Institutions show how much we have in common with you in that direction.

I am fortunate enough this year to belong to the official delegation of the French Government to this Twelfth International Navigation Congress.

I take pleasure in now thanking all its members, prominent State engineers, for their welcome to a humble mechanical engineer, who has become an enthusiastic traveller at the close of his career.

It is from this point of view of a traveller that I have been able to reply to Americans who asked me what were my impressions of their country.

The people of the United States appear to all of us to be the youngest, the most intrepid, and the most energetic of all peoples.

In 1893, one of our most worthy and distinguished colleagues, the lamented Gaston de Chasseloup-Laubat, prophesied in this very city of Boston the success of the new automobile industry in America. Well, the enthusiasm of Americans for automobiles has enabled their engineers and mecanicians to prove their capacity. I have admired the ability of your chauffeurs, and especially that of your young girls who drive these marvellous cars so fearlessly and with the same ardour as their gracious Scandinavian sisters, the legendary Valkyries rode their fantastic steeds.

My comrades of the Aero-Club of France, reminded me when I set forth for this country, of the respect with which they regarded your great engineer Octavius Chanute, who died last year. He was the enlightened apostle of aviation in America, and I remember the great pleasure we had in numbering him amongst our members.

I did not expect, gentlemen, to have to add to these sad recollections the expression of sincere condolences of my colleagues for the loss of your great aviator Wilbur Wright, who had so many warm friends in France.

I cannot conclude without congratulating, in my capacity of correspondent of several Paris journals, your incomparable reporters. They are also examples of courage and of professional ingeniousness.

I raise my glass in honor of the noble city of Boston, of the Boston City Club, and of the prosperity of the great American Society of Civil Engineers, and also of the Society of Civil Engineers of Boston.

Mr. Boutteville, who spoke after Mr. Brancher, expressed himself as follows:

Mr. Chairman and Gentlemen.

It is a great pleasure and a great honor to me to be entrusted with the task of tendering to the Society of Civil Engineers of Boston the friendly salutations of the Association des Ingenieurs des Ponts et Chaus-

sées et des Mines of France, and of addressing, on behalf of the delegation which has been sent by the French Government to the Twelfth International Navigation Congress, our heartiest thanks to the City of Boston, the Society of Civil Engineers of Boston, and to the Local Organizing Commission, for their kind and sumptuous welcome which has enabled us to visit the fine city of Boston and its magnificent port under such agreeable conditions.

The problems which you have to face for embellishing your city, and for improving and extending its port are most complex, but our visit to the great works which you have so ably carried out convinces me that you will know how to deal with the new ones in the best possible manner for the great interests you have at stake.

Allow me to tell you what an agreeable impression we shall carry away with us from our visit, which alas! has been too short in the city of Boston and its neighbourhood. The luxurious residences dotted about a charming country, and situated in the midst of verdure and large trees, these spacious avenues, fringed with elegant dwellings, these immense parks, the lungs of your city; and in fact, everything in Boston shows what efforts have been made for many years by the city authorities to render it comfortable and attractive. Allow me to congratulate you on not having huddled your houses together, and of having provided plenty of space around your public buildings which beautify your city, the architecture of which deserves special attention.

We had admired in other American cities some exceedingly clever copies of the principal monuments of Europe. The French delegates have been particularly flattered to find several small scale reproductions of our old French Cathedrals in various museums, and especially a model of Notre Dame de Paris. In this city, however, gentlemen, imitation is superfluous, for your monuments are worthy to rank with our own.

But, gentlemen, I am wandering somewhat from technical matters into questions of quite a different order. But I have been led into this digression by the artistic appearance of your city, which engineers have known how to enhance instead of spoiling.

In conclusion, I raise my glass in honor of the City of Boston, the Society of Civil Engineers of Boston, and the Local Organizing Commission.

From the City Club, the party proceeded to the South Station, where a special train was waiting to take them to Albany, the capital of the State of New York, where they were to join the main body of members of the Congress who had left New York by water to reach Albany via the Hudson river. In taking leave of the party at the station, Captain **W. H. Jaques**, Chairman of the Local

Reception Commission, addressed the members of the Congress who were present with the following valedictory remarks:—

In saying Adieu and wishing you all God-speed let me hope that we have in every way provided for your comfort and welfare, and that your visit to the Commonwealth and City will leave such a favorable impression that you will soon return to us, when I hope I will again have the privilege of joining in your welcome.

Mr. **V. E. de Timonoff**, Acting President of the Association, replied as follows:—

All the visitors are warm in their praise of the manner in which they have been received and cared for during the visit to Cape Cod and Boston and personally grateful to you for your personal attention to their comfort. The visit will be one of the brightest spots of the Congress' meeting.

The train left at 11 p. m. and reached Albany at 6.30 a. m. on the following day, where, on arrival, breakfast was served in the restaurant of the Union Railway Station. During the breakfast the baggage of the party was transferred to the special train provided for the visit to the "New York State Barge Canal".

Excursion from New York to Albany via the Hudson River and visit to the works of the "New York State Barge Canal".

On June 6th the members of the Congress who had remained in New York and who had not taken part in the Boston excursion, boarded the specially chartered steamer "Albany" of the Hudson River Day Line for this run of about 137 miles up the river with Albany, the terminal of the "New York State Barge Canal", as their destination. Besides the members of the Congress, there were on board a number of members of Engineering Societies whose headquarters were in New York, and representatives of Commercial Associations of that city, all of whom were to accompany the party as far as West Point.

The party started at the foot of West 42nd Street at 8.30 a. m. the steamer slowed down at the Interstate Palisades Park, N. J.,

nearly opposite 129th Street, New York City, to enable the party to inspect the replica of the "Half Moon", which, by arrangement, had been brought out and anchored in the river for the purpose. This remarkable reproduction of the vessel (about 75 feet long) on which the river, to which his name has been given, had been discovered and explored by Hendrick Hudson, excited much interest. It had been presented a few years before, by the Government of Holland to the Government of United States, and brought to America on the deck of one of the steamships of the Holland-America Line.



Steamer "Albany", Hudson River Day Line.

The steamer arrived at West Point, New York, about 50 miles above New York city, the seat of the United States Military Academy, at about 11.20 A.M. , Here a stop of about one hour was made for a visit to the Academy, the Cullum Memorial Hall and several of the other buildings.

When opposite Newburgh, about 58 miles from New York, the steamer again slowed down to give the party an opportunity to inspect the replica of the steamboat "Clermont", the first steamboat to navigate the Hudson River and the first successful commercial

steamboat in the world. A short stop was made at Poughkeepsie, 72 miles above New York, to admire the bold bridge over the river. From New York to Poughkeepsie the scenery had been varied and interesting. The steamer had passed the remarkable palisades of New Jersey, the lakes formed by a widening of the river, and, just below and above West Point the mountain range known as the Highlands. Between Poughkeepsie and Albany no stops were



Hudson River from West Point.

made. The weather unfortunately prevented a good view of the Catskill Mountains, which lie several miles to the westward of the river, but which ordinarily are plainly seen. All day was spent on the water and much enjoyed owing to the interesting explanations given by Captain Black on the training works which the Government has carried out on this waterway, for securing and maintaining a 12 feet channel to Albany. The Hudson river, as is well-known, forms the first link of the waterway line connecting New

York with the Great Lakes system, the present Erie Canal entering it at Troy, about 6 miles above Albany, while the New York State Barge Canal, which will be used instead and is now in course of construction, will enter it at Waterford, 11 miles above Albany and will accommodate the traffic of 2000 ton vessels.

The steamer arrived at Albany at about 6.10 P.M. where rooms had been reserved for the party for the night.

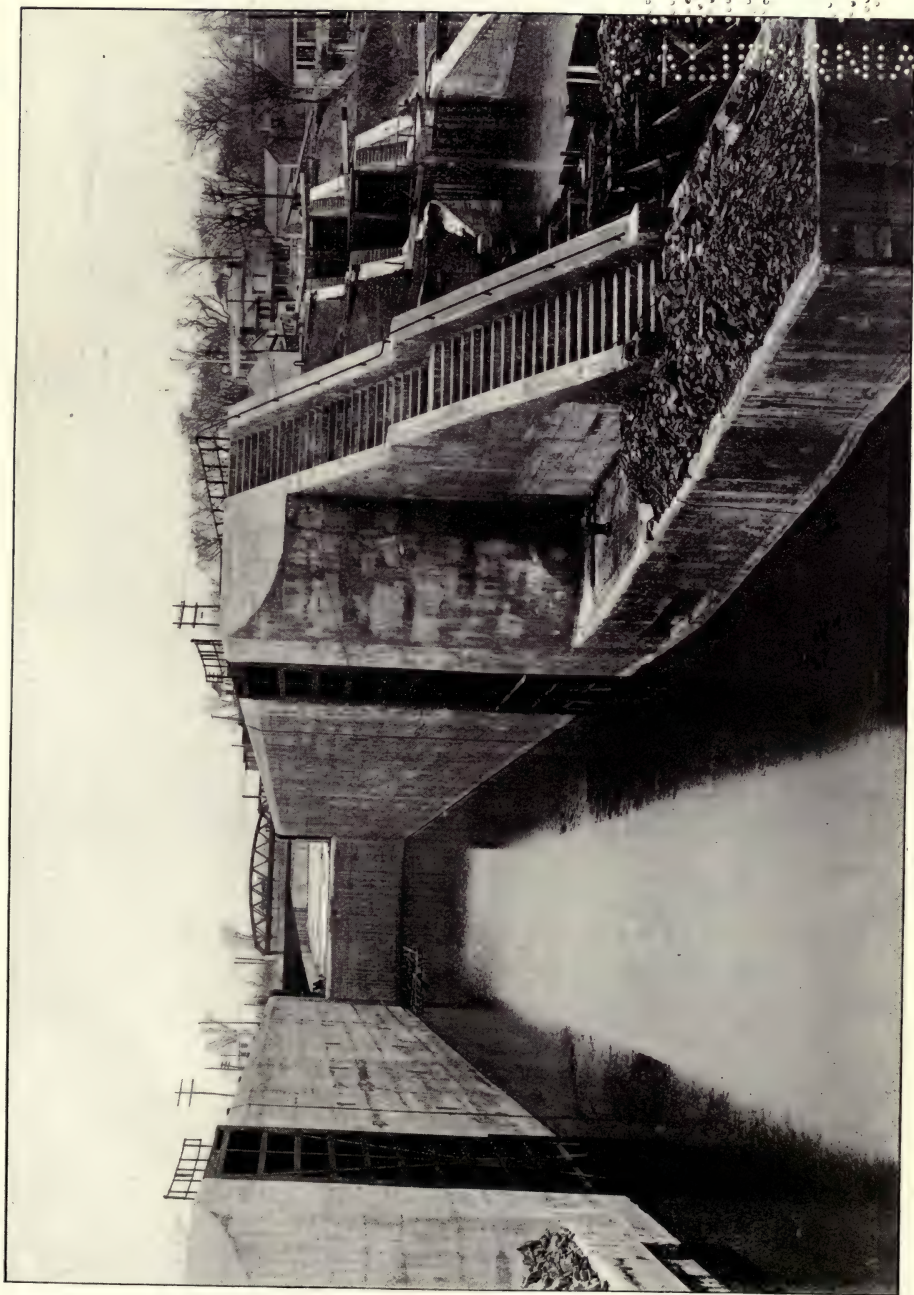
This trip was in charge of Mr. Joseph F. Hasskarl, formerly Director of the Department of Wharves, Docks and Ferries, Philadelphia. The visit to the Military Academy was in charge of Major J. C. Oakes, Corps of Engineers, U.S. Army.

On the morrow, June 7, the members who had come to Albany via the Hudson River, joined the members who had taken part in the trip to the "Cape Cod Canal", left Albany at 8 A.M. on a special train provided by the New York Central and Hudson River Railroad Co., consisting of 8 parlour cars, 3 dining cars and one baggage car for the "New York State Barge Canal". A few members had left Albany for Schenectady on a trolley car provided by the General Electric Co. for a visit to the works of that company at Schenectady before joining the main party. On this journey they had the opportunity of seeing an Indian reservation.

At Schenectady tests were witnessed of the turbo-electric propelling machinery for the United States Collier "Jupiter", an electrically propelled ship with a displacement of 20,000 tons. The 7000 H. P. steam turbine generator and the two large propeller motors were put in operation and tested under load at various speeds and in both directions of rotation.

Later a visit was made to the turbine department, where the Curtis turbines are built, assembled and tested. Other departments such as the works for the construction of electric locomotives were also visited. At 12.30 they rejoined the main party on the special train.

The train proceeded from Albany over the line of the Delaware and Hudson Railroad Co. to West Waterford — 11 miles above Albany — where an extended stop was made for the purpose of visiting the concrete locks of the "New York State Barge Canal", under construction, by which this canal is to be carried from the high Cohoes Plateau to a junction with the Hudson River.



NEW YORK STATE BARGE CANAL
Lock No. 2 at Waterford. A flight of three locks of existing Erie Canal shown on right

THE
ANNALS
OF THE
ROYAL
SOCIETY OF
LONDON

What is known as the "Barge Canal" of the New York State, consists in the enlargement of the Erie Canal and of three other branches of the State's old and quite extensive canal system. The work involves about 440 miles of canal construction or enlargement or canalization of rivers, while the intervening locks and adjoining rivers bring the total up to 790 miles of internal navigation for vessels of barge canal size.



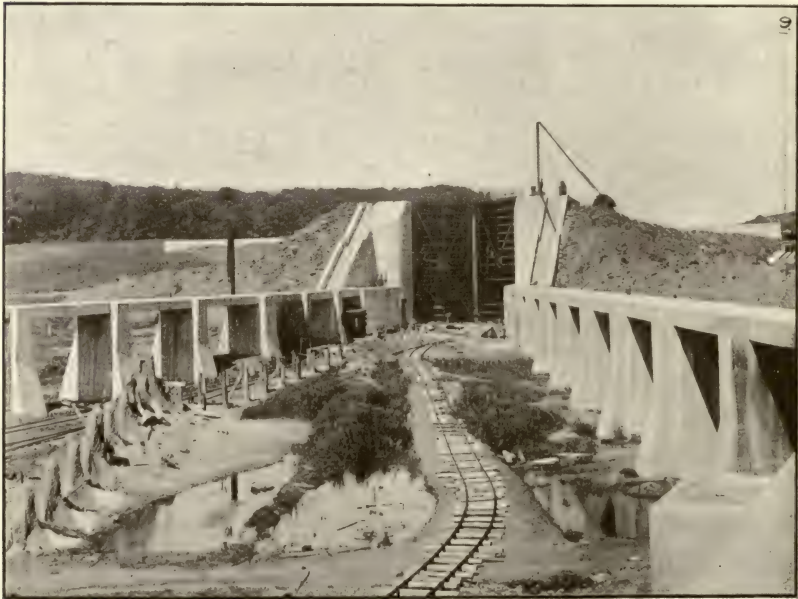
New York State Barge Canal. Lock No. 3 and bypass near Waterford.

The law covering the enlargement requires a depth of 12 feet in all parts. In canal sections, the channel is to be at least 75 feet wide at the bottom. In rivers and lakes the width is 200 feet. The locks are 320 feet long between gates and 45 feet wide. 72 % of the length of the whole system is in river or lake channels. For more than one third of the distance between the Hudson River and Buffalo, the Mohawk River is utilized, which river, it should be stated, breaks through the Appalachian Mountain system at Little Falls affording the only practicable route for a water line, without excessive locking, between the Atlantic and the interior of the United States. Near its confluence with the Hudson River, the

Mohawk River descends about 169 feet at and near Cohoes Falls. To overcome this descent a land line, about 2 1/2 miles long, from the Mohawk to Waterford with 5 locks, is under construction, and it is this portion of the canal line, together with the dam in the Mohawk River at the head of the line, that was inspected at West Waterford. This section included a large number of interesting features of construction.

On completion of this inspection, the train, left at 11.15 A.M., and stopped at Schenectady at 12.20 noon to take up the other members of the party and arrived at Fort Plain at 2 P.M., luncheon having been served in the dining cars during the run.

At this point the movable dam in the Mohawk River was visited. This dam was completed and in service and a demonstration of its operation was given by raising one of the upper tiers of gates and allowing water to escape through the notch thus formed in the crest; the gate being then lowered and the opening closed. This is the uppermost of the 8 movable dams by which the Mohawk



New York State Barge Canal.
Concrete dock between two of the locks near Waterford.



New York State Barge Canal. — Movable dam of bridge type at Cranesville.

River is canalized above Schenectady. Below Schenectady there are two fixed dams, one of which is the dam at the head of the West Waterford line already mentioned.

The next stop, at about 3 P.M., was at Little Falls where a spur of the Adirondack Mountains crosses the Mohawk River valley and the line of the canal.



New York State Barge Canal.

View of completed canal looking towards Lock No. 2 at Waterford.

At Little Falls the chief object of interest was the lock now building, the lift of which is 40 1/2 feet, the side walls being 61 feet high. The lower gate at this lock is of the lift type — the only one of this style on the canal. Between the side walls at the lower gate there has been placed an arched concrete beam under which the boats will pass to the lower level. The extreme narrowness of the gorge through which the Mohawk River passes at Little Falls rendered the problem of canal construction at this point extremely difficult.

After inspecting lock N° 19 en route the party were served with light refreshments between Little Falls and Rome. In accordance with the programme, the canal works in Rome and the Delta dam 5 miles to the north were visited. Automobiles were provided to convey the party to the site of the dam at Delta.

The Delta reservoir is one of the two reservoirs intended to increase the water supply for barge canal purposes. The dam, spanning the upper Mohawk River, is 1100 feet in length and the crest of the spillway is 100 feet above the lowest part of the foundation. The reservoir extends over a length of 4 miles, with a width of 2 miles at its widest point. It has obliterated one village and a few houses on the outskirts of another.

Those of the party who did not take the trip to the Delta dam walked along the canal construction work just south of Rome. The locating of the canal in this vicinity had involved very careful and extended studies. Three general schemes were considered; first, keeping the alignment north of the present New York Central Railroad location, which plan carried the canal through the heart of the town; second, crossing the railroad alignment twice, a plan that necessitated two long and expensive skew bridges; third, taking a southern alignment for the canal and re-locating the railroad still further to the south. The latter of these plans was the one adopted. It involved several interesting structures and a large amount of excavation and embankment. At Rome the canal line leaves the Mohawk valley and is carried to the west end of Oneida Lake, in which lake, for a distance of 19 miles, no construction work is needed. It then follows the outlet of Oneida Lake to the Oswego River, thence up the river a short distance and then follows westerly tributaries of that river, or their valleys, until within a short distance of Rochester, passing several miles to the north of Syracuse.

Leaving Rome about 6.30 P.M., the train arrived at Syracuse at about 7.30 P.M., and the party proceeded to the Onondaga hotel, near the railway station, where quarters had been engaged for them.

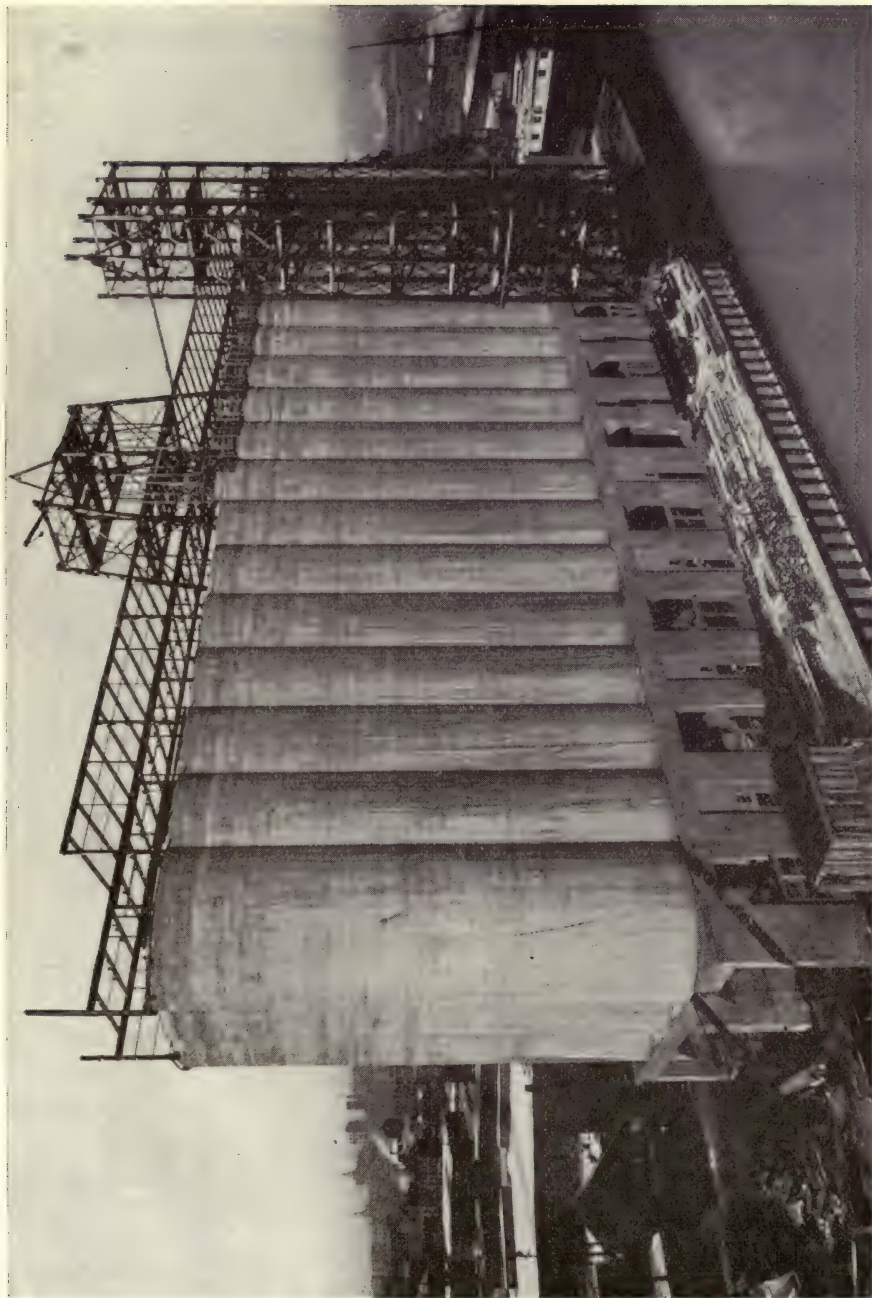
On the following day, June 8th, 1912, the party took the same train at 7.30 A.M., which had been used on the previous day, to convey them to Buffalo via Rockcut and Lockport. Passing

Rochester a glimpse was had of the falls of the Genesee River and of the deep gorge of the Genesee below Rochester. At about 10 A.M. the train halted at the long rock cut, through which the line of the barge canal is carried to rejoin the line of the present canal. From this point to Lockport the railroad runs closely parallel to the present Erie Canal, which is being enlarged to form the barge canal.



New York State Barge Canal.
Lock and movable dam at Tribes Hill.

The next stop made was at Lockport. The work at Lockport is somewhat spectacular. It is at this point that the canal ascends to the top of the Niagara escarpment through a gorge which geologists tell us was formed by an outlet of one of Lake Erie's predecessors, at a time when the discharge of the lake was not by the Niagara River. Here there was a double flight of five locks of the existing Erie Canal. In the place of the south tier of these locks, a flight of two locks for the barge canal is being constructed,



Grain Elevator under Construction, Buffalo.

the north tier of the old locks being retained to accommodate present navigation. As the western part of the canal is fed chiefly by water from Lake Erie, it became necessary to build a large by-pass around these locks. For this purpose a tunnel was constructed which supplied both the requirements of a by-pass and the facilities for taking water needed by power users. ,

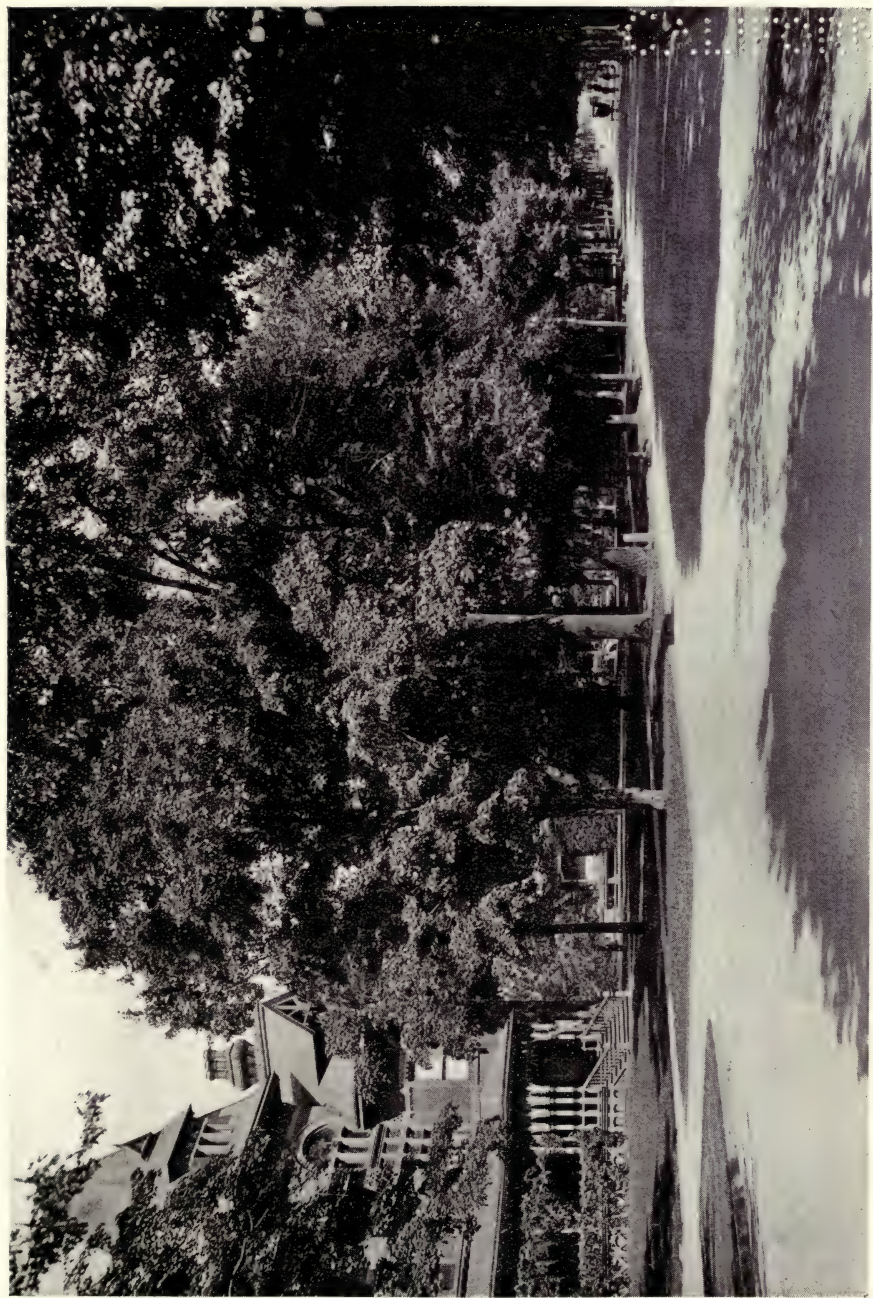
Trip to Buffalo and the Niagara Falls.

At about 2 P.M. the train conveying the members of the Congress arrived at Buffalo (Terrace Station), luncheon having been served during the stop at Lockport. At the station the members were met by the local entertainment commission and taken by automobiles to the Lafayette Hotel, where they were to be quartered during their stay at Buffalo.

On the train from Lockport invitations from the "Buffalo Club" for the reception in the evening had been distributed, together with cards printed in three languages, advising the party of the arrangements for their entertainment while in Buffalo. At the hotel they were presented with invitations to visit the Albright Art Gallery, and the Buffalo Historical Society building in Delaware Park and its historical collections.

Excursion around Buffalo Harbor and to the Lackawanna Steel Plant.

This alternative trip was chosen by a large number of the delegates who, shortly after arriving at the Lafayette Hotel, were taken in automobiles to the foot of Washington Street, where the steamer "Favorite" awaited them. The steamer proceeded inside the outer breakwater (which protects the so-called outer harbor) to the Lackawanna Steel Company's plant. Here a special train of observation cars awaited them and carried them through this immense plant, the trip lasting about an hour. Re-embarking on the steamer they were taken to the Black Rock Harbor, in the northern part of the city of Buffalo on the Niagara River near where it leaves Lake Erie. Refreshments were served on board. At Black Rock an inspection was made of the very large ship lock



DELAWARE AVENUE, BUFFALO

1000
1000

now being constructed by the United States Government to enable deep draught lake vessels to proceed from Buffalo to Tonawanda around the rapids at the head of Niagara River. This lock is 650 feet in length by 70 feet in width. After the inspection the boat proceeded to Bridge Street, Buffalo, where automobiles awaited them and took them back to their hotel.

Some of the members also inspected some grain elevators in Buffalo during the afternoon.

Visit to the Country Club.

This visit took place simultaneously with the steamer excursion, a smaller number of members, however, participating. The Club House is situated in the beautiful and extensive Delaware Park. The members were taken there in automobiles through the most interesting residential section of the city, and on arrival were received by the members of the club and their ladies. An exhibition polo game was played for their benefit, after which a buffet luncheon was served on the lawn and in the Club House. After passing a most enjoyable afternoon here, the party was brought back to the hotel.

Reception at the Buffalo Club.

This reception took place at 9 P.M. in their large and handsome Club House and was largely attended by members of both sexes. The guests were received by the officers of the Club, and spent the evening in conversation with the prominent Buffalo people present. An informal luncheon was served but no addresses were made.

Automobile trips in Buffalo.

As on the previous day, automobiles were again placed at the disposal of the visitors and they were taken for an inspection of Buffalo's handsome residence streets and beautiful parks. Stops were made at the Albright Art Gallery and the Buffalo Historical Society building, where informal receptions were held.

Trip to Niagara Falls.

At 1 P.M. the party — except a few who had left for Niagara Falls in the morning—assembled at the Terrace Station, from which they were taken by special train to Niagara Falls. The train was composed of handsome day coaches constructed expressly for the "Empire State Limited", the fastest train of the New York Central and Hudson River Railroad Co., and one of the fastest long distance trains in the world.

The Buffalo Local Commission was represented on this trip by Senator Henry W. Hill, Acting Chairman, Mr. John W. Robinson and Mr. Henry D. Saunders. Several gentlemen representing the city of Niagara Falls, N. Y. also accompanied the train. The train was in charge of Mr. Harry Parry, of the New York Central and Hudson River Railroad and a member of the Buffalo Local Commission.



Whirlpool Rapids, Niagara Falls.



NIAGARA FALLS FROM THE AMERICAN SIDE

Photographed by Detroit Publishing Co.

UNIT OF
CALIFORNIA

Arriving at Niagara Falls at about 2 P.M., special trolley cars were taken for a trip over the so-called "gorge-route". The route crosses the Niagara River to the Canadian side, furnishing an excellent view of the falls while crossing, thence proceeds southerly to the line of the falls, where a particularly fine view is obtained, especially of the Canadian Falls. Here a stop of some length was made, to enable the members to proceed to the brink of the Falls. The large Canadian Power Plants were also seen in this vicinity. The route then follows the Canadian side of the river, on top of the high cliff on the west side of the gorge, past the whirlpool rapids and finally down the Niagara escarpment to the low ground bordering Lake Ontario. Here it crosses to the American side at Lewiston and proceeds south to Niagara Falls, N.Y., under the cliffs on the east side of the gorge and but little above the level of the River. Stops were made at points from which particularly fine views of the rapids could be obtained. After this trip, which occupied about 2 hours, the party visited the Cataract Power Plant, Goat Island, Prospect Park and other points which interested them or from which fine views could be obtained. Dinner was served about 6 P.M., as previously arranged, at the International Hotel, and at 8 P.M. the members returned by the special train to Buffalo. On arrival at Buffalo automobiles, which were in waiting, conveyed them to the wharf of the steamship "Northland" at the foot of Main Street.

The warm reception that had been accorded to the members by the people of Buffalo, and the excellent arrangements that had been made for their entertainment during their brief stay, had been highly appreciated by them, and they were particularly pleased by meeting here the Hon. De Alva S. Alexander, who, as Chairman of the Committee on Rivers and Harbors of the House of Representatives, United States Congress, had been largely instrumental in securing the passage of the law whereby the Association had been invited to hold the 12th Congress in the United States and had taken an active part in the organization of the Buffalo reception.

**Trip on the Great Lakes from Buffalo to Chicago
via Cleveland, Detroit, Sault Ste Marie, Milwaukee and Gary.**



Steamer "Northland".

The steamship "Northland", which the members had boarded after returning from Niagara Falls weighed anchor at 10 P.M. en route for Cleveland 176 miles distant. She is the largest and finest long distance passenger steamer now in service on the Lakes. She is 386 feet in length, 44 feet in width, and 26 feet in depth, her tonnage being 5000 tons.

The Manager of the Northern Steamship Co., Mr. F. C. Cruger, had arranged to accompany the party, and the General Passenger Agent, Mr. W. M. Lowrie, was to accompany them as far as Detroit and afterwards to rejoin them at Milwaukee. Handsome, illustrated booklets had been prepared by Mr. Lowrie, containing a description of the points to be visited and a map giving scheduled times of arrival and departure at each point, with distances between points, for distribution to the members.

The steamer arrived off Cleveland at about 8 A.M. on June 10th, 1912, which was nearly an hour ahead of her scheduled time, and therefore went some distance beyond Cleveland and returned along

the shore in order that the members might have a view of the west part of the city and of the western portion of the outer harbor. The members had an opportunity of watching the loading of a large barge with a cargo of coal by one of the four car-dumping machines installed in the harbor, the capacity of each of which is approximately 50 cars per hour.

The members of the Cleveland Commission and the Reception Committee then arrived, and, after introductions on board the "Northland" the entire party was transferred to the steamer "Eastland", which, being smaller, was better suited for the inspection of the harbor.



Unloading iron ore from lake vessel, Hulett system, Cleveland.

The "Eastland" proceeded at once to the iron ore unloading docks of the Pennsylvania Railroad Co. in the western part of the harbor where the steamship "Wm. P. Snyder", the second largest vessel on the Great Lakes, was being unloaded by four Hulett "clam shell" machines. The "clam shell" bucket, which is sent to the outer harbor, protected by the breakwater now being



Public Square, Cleveland.

has a capacity of 17 tons. The unloading capacity of the full plant is 3,000 tons per hour. In the construction of these docks 65 acres of land were reclaimed by filling, in the summer of 1911. The docks are founded on concrete piles.

After viewing this operation for some time, the party proceeded on the "Eastland" for a short trip of inspection of the eastern portion of the outer harbor, protected by the breakwater now being constructed by the United States Government. The harbor of Cleveland, which is a typical lake harbor, is composed of an artificial outer harbor, formed by two breakwaters on the same line and parallel to the shore, with an opening opposite the mouth of the Cuyahoga River (the west breakwater having also an arm connecting it with the shore); and an inner harbor formed by deepening the Cuyahoga River. The breakwaters—then much less extensive than now constructed or under construction — were originally built of timber cribs filled with stone. For the most part these have been cut down to below the water level and reconstructed of concrete or rubble mound built on this foundation. The construction of the new work is similar. The outer harbor is being dredged to a depth of 25 feet.

The inner harbor consists of the lower 5 1/2 miles of the Cuyahoga River and of the "Old River Bed" which opens into the river near its mouth. The channels have an average width of about 200 feet and a depth of 20 feet.

The "Old River Bed" is extensively used for the transfer of iron or from water to rail. Three dry docks are also located here. The lower river is much used by passenger and packet freight vessels, while along the upper river are located a variety of industries, including four blast furnaces, a coal loading dock, flour mills, lumber yards, etc. Practically all the freight received here is for local use. The navigable portion of the Cuyahoga River and the "Old River Bed" are crossed by 22 railway and highway bridges of various types, among which are the longest single track and the longest double track, single leaf, rolling lift railway bridges in the world. The former spans a clear channel of 204.3 feet and the latter 160 feet.

The numerous and abrupt turns of the Cuyahoga River render navigation of its upper limits tedious, and, in the case of the larger

lake vessels, impossible. On this account there has been a considerable agitation of the question of relieving this condition either by easing the bends or by cutting new channels to afford a more direct route.

The above description of Cleveland harbor is, with only minor changes, applicable also to the harbors at Buffalo, Milwaukee and Chicago.

The "Eastland" returned to the "Northland's" wharf about noon.

Luncheon in Chamber of Commerce Hall.

The party was taken in automobiles to the Chamber of Commerce building, on the Public Square in the centre of the business district of Cleveland, where a buffet luncheon was served at 1.30 P.M. After the luncheon brief addresses of welcome were made.

Mr. H. H. Johnson, President of the Chamber of Commerce and Chairman of the Cleveland Local Commission spoke as follows :

Mr. H. H. Johnson (in English) :

Gentlemen of the Twelfth International Congress
of Navigation,

I am asked by Governor Harmon of the State of Ohio, who expresses his very great regret at not being able to be present today in person, to welcome you to that hospitable State. This is the only opportunity you have of touching upon our shores, and upon behalf of the Governor and of the citizens of the State of Ohio, we bid you welcome. We are a small, relatively insignificant city on the south shore of Lake Erie, as you observed, engaged in manufacturing and mercantile business. We are manufacturers and merchants, and as such we welcome you most heartily to our midst, and in so far as you find anything in the way of navigation or allied thereto, we desire to make you welcome.

This is an important body. It is important because navigation is the mother of commerce, and commerce is the mother of us all. We would have no civilization, no arts, no life, if we did not have opportunity to exchange commodities with each other over the highways, natural and artificial, that man is making use of. Thus we may say that navigation is the grandmother of us all, and as such, gentlemen, we greet you. The great interests which you represent all over the world are very close to our interests. And the importance of the world-wide influence which you men exert we appreciate in our midst here, being largely engaged, as we

are, in the navigation of these Great Lakes, a sample of which you have seen last night and this morning.

Another thing which makes your body important is that it is a world congress. We cannot discuss the tariff, the traffic charges on our railroads and steamboats, without arriving, before we get through with their consideration, that they are universal, international questions. And it is from that standpoint, that we are endeavoring to get a view of the questions that beset any mercantile and commercial nation. The very great difficulty is to get men busy with their own affairs, as we are in this new country, and as I take it, some of you are in the old countries from which you come, and we have the greatest difficulty to convince our membership and our citizens, that the only solution for some of the questions is a world solution. We invite you to take a message from the City of Cleveland and from its Chamber of Commerce, that we are your brothers, in whatever nation you live; that we want a solidarity of feeling; that we want to take the world view. We appreciate that from that world view come very difficult questions, in colonization, in trade routes, in trade customs, in tariffs between nations, differences of language, habit and speech, but they are difficulties that in this century absolutely must be solved. And we hope that if this Chamber and this City of Cleveland may exert any influence upon you, it may be that in any effort that you may make in your respective countries looking to that end, you will receive an answering chord from the little village on the south shore of Lake Erie, in the State of Ohio, called Cleveland.

Again, gentlemen of the Twelfth International Congress of Navigation, the Chamber of Commerce of the City of Cleveland welcomes you to the State of Ohio, and to its city, and to its halls; and we have with us to further extend the welcome from our city, its chief executive officer, Mayor Newton D. Baker, of the City of Cleveland. I ask him to present that welcome to you in person. Gentlemen, Mayor Baker.

Mayor **Newton D. Baker** (in English) :

Mr. President and gentlemen,

The first President of the United States realized, perhaps more keenly than most of us laymen, the political importance of transportation. George Washington felt that a country like the United States, largely uninhabited, continental in its extent, reaching from one ocean to another, was likely to be characterized by the building up of separate communities, and ultimately to fall apart because of a lack of means of intercommunication between the several parts of the country. And so, with the political foresight and prescience which has characterized his reputation as a great statesman, he suggested that there should be built in the United States a series of canals, beginning perhaps at the city of Washington, or at least

beginning at our eastern seaport, and running out through the West until ultimately the Mississippi River should be reached, and beyond that the revolutionary imagination of course could not go. Those canals were started. There are some of them, two of them I think, fairly long in extent, that are still somewhat used. But when one compares the lazy, slow-going canal projected by George Washington, with the modern development of industry and commerce in a nation which has caught the spirit of progress as the United States has, one realizes how little even the wisest statesman in any day or generation can adequately plan for a short future for mankind.

Fortunately, our need of intercommunication has been met by invention, and the development of the railroads and the various developments of electricity have brought us in the United States so that now those who live upon the Atlantic may say good morning to those who live upon the Pacific Coast, by telegraph. We have now means of intercommunication that prevent us from becoming foreign to one another, either in our knowledge of one another, or in our access to one another's opinions and interests.

I make this illustration only to show that from the very beginning of American history, transportation has been regarded as having a very high political importance. And so in this later, finer day, in the age of the world when the national lines that separate us from one another, whether they be imaginary lines or oceans in their extent, are negligible and can be overlooked in this finer and later day when men throughout the civilized world everywhere are coming to recognize, not in any academic sense but in a very real and pertinent sense, the brotherhood of mankind, the transportation problem, whether waterborne or land-borne, the means of transportation are the key to the advance of civilization.

And so this Congress comes as a group of men who have studied in foreign countries water-borne transportation in one form and another. They come to the United States to mingle their ideas here, and to leave some ideas behind; and if it should be that, by reason of the singularity of our situation, with a great set of inland seas forming an international boundary between us and the British possession, we have developed a form of water-borne commerce that is unfamiliar in your own countries, the possibilities of that system will be of interest to you. My own feeling about that is that knowledge of one another is the thing that is needed to break down the old-time hostilities that used to divide us into warring and competing camps. Knowledge of every kind is valuable from that point of view, and when the engineers of Europe and the engineers of America meet, one time on American soil and another time on European soil, they see that after all, engineers are citizens of the world; and when historians from abroad come to us, and our historians go abroad, we find that historians, after all, are citizens of the world. And so by this intermingling of our scientific men, of the leaders of opinion in mechanical and scientific lines, or even if our poets could go abroad and their poets come to us, the ultimate effect of it all would be an interchange of ideas

and sentiments, an approach between us, that would leave us more citizens of the world, with less division, more unanimous of sentiment and therefore a greater progress for mankind, both material and spiritual.

Looking upon you as ambassadors for the spread of civilization and the creating of generous sentiment between citizens of different nations, I welcome you to the City of Cleveland and trust that your recollections of your visit will be as delightful as our recollections of your visit will be delightful. I welcome you to the City of Cleveland, and regret that your stay is to be so short.

Mr. H. H. Johnson (in English) :

I take great pleasure in doing what is an entirely unnecessary act — introducing the acting President of the International Association of Congresses of Navigation, M. de Timonoff.

Mr. de Timonoff, speaking on behalf of the Members of the Congress in French, replied as follows to the previous speakers :

Mr. de Timonoff :

Mr. President of the Chamber of Commerce, Mr. Mayor, and Members of the Twelfth International Navigation Congress :

If, contrary to my practice hitherto, I speak in French, it is in order to be better understood by the greater number of the Members of our Congress who have been welcomed in Cleveland by its Chamber of Commerce. I do this with all the greater pleasure as the speech of welcome which was addressed to us by the Honorable President of this Chamber was so modest in its reference to the work of the citizens of Cleveland that it gives me the opportunity of remedying what is probably an involuntary injustice on his part... Our visit this morning to the Port of Cleveland has shown us the magnificent results which have been obtained in the handling of huge masses of iron ore and coal by the most perfect machinery in the world. I need not labour this point. We are still under the spell of that magnificent and imposing sight, which testifies to the ingenuity and over-flowing activity of the citizens of Cleveland, in the spheres of industry and navigation. But their progress is no less in the Municipal sphere. Do you wish some proofs in support of my statement? We all know that in the cities of the United States tramway fares are all 5 cents. The city of Cleveland is a brilliant exception. It has been able to establish and maintain a tariff of 40 % less so that the traveller only pays 3 cents for his tramway journey. We have also on several

occasions noticed in most of the cities of the United States the absence of what we call "town Architecture"; that is to say, the art of designing groups of buildings which have an harmonious collective effect. The City of Cleveland is an exception. It is now making great efforts to erect imposing and artistic groups of public buildings which are worthy of Ancient Rome or Paris. I could give you plenty more instances of this kind, but I will not do so as I think that what I have just said will suffice to show how far short the Honorable President of the Chamber of Commerce of Cleveland has been in his estimate of the importance and interest of Cleveland... But there is one point on which he has made no mistake, and that is when he referred appreciatively to the hospitality of the City of Cleveland towards the members of our Association. This hospitality, so charming and so full of grace, has gone to our very hearts.

On behalf of all the nations which are represented here to-day, I address our deepest thanks to the citizens of Cleveland, and more especially to the Chamber of Commerce and to the Municipality of that city. (*Loud applause.*)

At the conclusions of Mr. de Timonoff's address it was announced that Col. John Millis, Corps of Engineers, U. S. A., in charge of the Cleveland Engineer District, would be glad to take any members who might desire on a visit by Government steamer to the Cuyahoga River.

Alternative excursions in the afternoon.

The party divided, some of them visiting Cuyahoga River on two Government steamers in charge of Colonel Millis and his assistants, while the others were taken in automobiles, each under the guidance of a member of the Local Commission, to various industrial plants and points of special interest in the city.

At about 5 o'clock the entire party in automobiles assembled at the Euclid Avenue entrance to Mr. John D. Rockefeller's "Forest Hall" estate and drove for about an hour through the estate by special permission of the owner. After further drives through the parks, the party gathered at the Country Club, on the Lake shore, several miles east of the city, at 7.30 P. M. for a banquet given by the Club.

After the return of the "Eastland" at noon, the ladies of the party, instead of proceeding to the Buffet luncheon at the Cham-

ber of Commerce building, went in automobiles under the guidance of a Cleveland Committee of Ladies, to the Mayfield Country Club, about 8 miles east of Cleveland, where luncheon was served. After luncheon the ladies drove in automobiles through the parks and residence district, joining the men members for the drive through Mr. Rockefeller's estate and later for the banquet at the Country Club.

Banquet at the Country Club.



Country Club, Cleveland.

This banquet took place in the large hall of the Country Club, which had been finely decorated with flags. Mr. Harry Coulby, President of the Pittsburgh Steamship Co., and a Director in the Lake Carriers' Association, acted as Toastmaster. The following speeches were made.

Mr. **Harry Coulby** (in English) :

Ladies and gentlemen,

On behalf of the marine interests of the Great Lakes, I want to extend a welcome to the gentlemen and delegates of the International Congress of Navigation.

Last week, when the local committee were figuring out a programme for today, the question was raised as to what kind of weather we would have. The gentleman who had charge of the arrangements said, "Don't bother at all about the weather; it will be fine, and the wind will be off the lake." So that whatever pleasure you may have had from your visit

in Cleveland today is very largely due to the efforts of the gentleman who had charge of the arrangements, and whom I will now introduce to you, Colonel John Millis of Cleveland, who will respond to the toast, "Our Guests".

Colonel **Millis** (in English) :

Mr. Toastmaster, our guests, ladies and gentlemen of Cleveland :

I am very grateful to the toastmaster, in the first instance, for putting upon me the responsibility for the weather, and I will confess that I have been rather proud of my success in that line today.

The specific subject upon which it has fallen to me to make a few remarks in order to start the oratory of the evening, is quite a familiar one, and an entirely appropriate one upon all occasions of this nature. But upon this particular occasion it is a term, "Our Guests," which has an unusually broad and comprehensive and particularly appropriate significance. As you have learned by your association with the ladies and gentlemen who constitute our guests for the day, they have come to us from almost every civilized nation on the face of the earth.

Almost exactly twelve years ago the duty devolved upon me, partly by accident, of helping to represent the United States at the Eighth International Congress of Navigation, which was held that year in the city of Paris, in conjunction with the magnificent exposition that the people of France inaugurated, and to which they invited all the nations of the world, in order to commemorate the initial year of the present century. And you will appreciate how hard put to it we were for orators and oratory, when I add that at the closing session of the Eighth International Congress of Navigation, the duty also devolved upon me of making the closing speech for the United States delegation. It was not much of a speech, and I don't think I have ever entirely forgiven the people of France for translating it into French and publishing it in the beautiful bound book of the proceedings. One of my friends from Paris has told me today that he distinctly remembers that speech—I don't wonder—I wish that I could forget it. However, the speech did comprise an expression, however poorly it may have been put, but an expression all the same, of a hope that we would have the pleasure and the privilege of at some future time entertaining the International Congress of Navigation in the United States. After twelve years that hope has been realized. And I am sure that all the people of Cleveland feel especially honored that you have consented to make this city one of your stopping places in your tour of the Great Lakes after the close of the Congress proper in Philadelphia about two weeks ago.

I myself derive a considerable amount of personal satisfaction from another circumstance, which is also perhaps accidental, but which is

nevertheless happy from my point of view, that it so happens that I am stationed in Cleveland at the time of your visit to this beautiful city.

I am sure that I am expressing a sentiment that is entertained by every citizen of Cleveland, when I say that we are exceedingly glad that you came; we regret very much that your stay will be so short; and we hope that, when you return to your respective countries and your respective homes, you will retain among the memories which you will carry with you of your visit in this year 1912 to the United States, and on the occasion of the Twelfth International Congress of Navigation, a small compartment of recollection for the city of Cleveland, the sixth city in the United States of America. (*Loud applause.*)

The Toastmaster (in English) :

Ladies and gentlemen, the next topic is "The Great Lakes." Just before the coffee, the official stenographer asked if I would give him a copy of my speech. I told him I was the Toastmaster, and that I thought the function of a Toastmaster was that of a ringmaster. But I must admit that I am full of the Great Lakes, and I can prove it by showing you my wine glasses. (*Laughter.*)

There is, however, with us here tonight a gentleman who has grown up with the Great Lakes, who has watched its development from its infancy. I was, however, very much surprised to have Homer Johnson come and say that he would have to move to the middle of the room, that the people would n't be able to hear him from this end. Who ever heard of a body of men that couldn't hear Harvey Goulder when he started? I will prove it, and Mr. Homer Johnson will escort him to the best place, where all the ladies can see him.

Mr. Harvey D. Goulder (in English) :

Ladies and Gentlemen,

Permissible time is so brief for the subject that I may only bluntly give some figures which I beg you do not take as in any spirit of boastfulness, but rather that in economic questions, public or of the family, the exponent "X" or "Y" may, with the same dignity, represent one or one thousand. I can only in some general way indicate how we are endeavoring to solve problems on the Great Lakes in Transportation, which throughout the world is the basis of Commerce, as that is the fundamental of civilization and of modern life. However we may idealize or divine, all would be whistling against the wind unless sustained by earnest practical efforts in Commerce.

Ours has been comparatively a recent development. Fix in mind that later than 1805 the only commercial vessel then on Lake Erie was taken

overland around Niagara Falls to Lake Ontario, because there was not business for her above. Following the opening of the Erie Canal in 1826 and of others through Ohio and Pennsylvania, commercial movement started first up the lakes in farm products, bread stuffs, provisions and manufactures, until about 1840, when the trend began to turn eastward. By that year Chicago had attained a population of 4470, and Cleveland 6071. In 1855 the barrier between Lake Superior and the lower lakes was broken by canal and locks to overcome the drop of 18 feet. By 1866 the Federal Government had spent but three million dollars in improvement of channels and harbors of the Great Lakes. The start began with draught of less than ten feet in some narrow, restricted reaches of the natural waterway, and even less in some of the later developed great harbors. The original Welland Canal around Niagara Falls carried seven and a half feet draught.

Full details are readily accessible in official statistics, but speaking broadly, beginning in 1855 with 14,500 tons carried through the Sault Canal, we reached sixty-two and one-half million tons dead weight of cargo through that canal in the season of 1910; fell off somewhat in the business depression of 1911, and have started to strongly exceed 1910 in the present season.

Demands of the iron industry called for ore from the rich treasury in the Lake Superior region, which furnished in 1910 more than forty-two million tons, more than 80 per cent. of all the raw material in the production of our pig iron of over twenty-seven and a quarter million tons. Nearly all came down by lake approximately two-thirds to ports of Ohio, now the fifth industrial state of the Union. Of total tonnage of every description documented under our flag June 30, 1911, nearly 40 per cent., and of metal (the more modern and efficient working tonnage) about 55 per cent. were engaged on the Great Lakes; practically directed at and from Cleveland, where force of controlling circumstances fixed the head and administrative centre of direction for this commerce, which in ton mileage service performed reaches more than 25 per cent. of that by the railroads of the United States, at a cost of 67/100 of a mill per ton mile in 1911, to be somewhat reduced for 1912; a cost less than 10 per cent. of the average rail cost in the United States and perhaps not exceeding 20 per cent. of cost by the most favored railroad of this or of any country. It is common belief that fifty million tons of ore, averaging quite 55 per cent. on dry analysis in metallic iron will come down the Lakes this season; and movement of grain, coal, lumber and other commodities to an equal amount is predicted. In this service the largest ship can carry fourteen thousand tons on a draught of less than 20 feet; she is 614 feet long, 64 feet beam, 33 feet moulded depth.

The freight rate of some 70 years ago approximated \$80 a ton to the East, \$100 westward. I recall an old case based on a freight rate in about 1873 from Escanaba to Buffalo of \$7.50 a ton; the current rate is 25 cents net to the ship.

You have been solving just such problems by increasing channels and harbors, size of ships, canalizing and prodigious advance in terminal facilities and cargo handling machinery, so you are bound to be interested in a word about how we have worked long similar lines. May we instance that in the 25 years from 1885 to 1910, speaking of traffic through the Sault Canal we accomplished a reduction in cost of 75 per cent., and so an increase from three and a quarter millions to sixty-two and a half million tons dead weight of cargoes; having in mind, if you please, some thirty-six millions published for the Suez in the latter year, and the estimate of some eleven millions for the Panama after ten years of operation; and in this connection the Sault Canal traffic represents a possible two-thirds of the freight movement on the Lakes.

I may only detain you to give briefly some figures. The first steam barge which marked the evolution from sail to steam on the Lakes, was the "R. J. Hackett" in 1869. She was 211 feet length, 32 feet beam, 20 feet 5 inches depth, with engines aft, the prototype of the modern bulk freighter of the Lakes and on draught of water then available carried something over 1,000 tons. One of the latest ships launched is the "William P. Snyder, Jr.", 614 feet, 64 feet beam, 33 feet moulded depth, capacity on present available draft about 12,000 tons, and on less than 20 feet draught, fourteen thousand tons. Again the average cargo in 1895 was eighteen hundred tons, increased to 8,325 tons in 1908, although since somewhat reduced by some lowering of water and conditions which I may not stop to consider. A comparison is at hand covering the operation of the record ship in 1891 in contrast with the record ship in 1909, as follows :

Number of trips	26	26
Number of crew	23	25
Days in commission	205	225
Average size cargo	2,164	10,940
Average draught of water through Sault Canal	14' 2"	19' 2"
Average time loading port.	4 h. 5 m.	19 h.
Average time unloading port.	12 h.	14 h.
Average labour cost per day.	\$50	\$66.15
Average wages per man per day	\$2.17	\$2.88
Total freight carried during season	58,437 tons	285,000 tons
Gross earnings per ton of freight carried . . .	\$1.09	\$0.69
Operating expenses per ton of freight carried.	\$0.89	\$0.417
Cost of construction.	\$200,000	\$420,000

Since 1902 more than 250 steel steamers have been built, only one under 400 feet in length (except a few for the Welland Canal trade), ranging in carrying capacity from forty-eight hundred to fourteen thousand tons; more than 100 of these over 500 feet in length, from eight thousand to over 10,000 and 25 over 600 feet, with 12,000 tons or more carrying capacity.

How our ships are constructed with a clear hold to accommodate loading, and especially unloading machinery; description of the development up to 17 tons of the mechanical "Grabber" for unloading; of the car dumper in general use for loading into the ship a car up to 100 tons of bituminous coal in from scant two to three minutes with minimum breakage; of the growth of terminal facilities and loading and unloading appliances generally, for these things and all this part of the story I may not take time. You have, or will have seen it all for yourselves. But I may not properly close without giving you succinctly the record of what we have attained for the essential feature of loading and discharging bulk cargoes of iron ore, coal, and grain. I am giving you probably the best but actual figures of working time. Iron ore, a cargo of 10,000 gross tons, loaded in 25 minutes, discharged in three hours and fifteen minutes; grain, a cargo of 320,000 bushels of wheat, loaded in two hours and 40 minutes, discharged inside of 12 hours; coal, cargo of 10,800 tons, loaded from cars on the track into the ship in five and a half hours, discharged in thirteen hours.

You will see from this hurried sketch how we are working out this problem of cheap water transportation, taking advantage of Nature's generous provision. What the future growth will be no prudent man will say. The story of it up to now reads like romance. We have had aid of the Government to something over one hundred million dollars for channels, breakwaters and harbor work. From the early day of General Weitzel we have had remarkable aid from the Engineers Corps to assist and guide, not strangely, because there is something about it all which attracts and appeals to the engineer, whose most cherished reward comes through triumph over obstacles accompanied with achievement of valuable results. General Poe, to whom we owe so much, designed the Poe lock at the Sault, 800 by 100 feet, to accommodate in one locking four of the largest ships ever to be in service on the Great Lakes, only to find on its completion in 1896 that even two of the largest could not be locked through together. He said :

"Surely such a commerce deserves every aid and encouragement that can be extended to them. Given a channel of 20 feet draft and it needs no prophet to predict a still more wonderful growth. Nearly 35 years I have watched this, but neither I nor anyone else within my knowledge has been able to expand at the same rate—the wildest expectations of one year seem absurdly tame the next."

Who may or shall adopt the role of prophet? (*Loud applause.*)

The Toastmaster (in English) :

Ladies and gentlemen, I see the next toast on the programme is, "The Ladies, God Bless Them." It seems to me that in the programme that should have come first. If it hadn't been for the ladies, there would n't have

been any Navigation Congress, any large ships, and I question very much whether there would have been any Great Lakes; if there had been, we would n't have known anything at all about them. In looking around for some one to respond to the toast, we of course selected the Beau Brummel of Cleveland, and I am quite sure the ladies will agree with me that he is the best equipped man in this audience to speak for the ladies. I will now introduce him to you—Mr. Hermon Kelley. (*Applause.*)

Mr. Hermon Kelley (in English) :

When our Toastmaster requested me to respond to this toast, he imposed upon me an impossible condition—he asked me to be brief; he told me that I was to speak less than five minutes. I repeat that that is an impossible condition. There is not a man living who has been able even to understand my subject in a lifetime, and I, a poor, modest, retiring youth, am asked to treat this subject in a paltry five minutes. My friend Mr. Goulder has occupied a space of time which was estimated by a lady who sat in my vicinity at an hour and a half, in giving you an account of the commerce of the Great Lakes. He has given you the statistics, convincing statistics of the greatness of his subject. Now, I am foreclosed from using statistics in treating my subject. I have always found that ladies object to statistics, whether it be figures relating to the size of the shoe, or to the age, or to any other matters. I have found a singular objection on the part of that sex to the use of figures.

And then again what a poor, paltry subject, after all, is the commerce of the Great Lakes, compared with Woman, that all-embracing subject ! The very smallest of these boasted works of man could never have been built, could never have been conceived, had it not been for woman. Not one shovel of earth could have been removed from the Livingstone channel, not one block of stone could have been placed in the great Cleveland breakwater, not the smallest rivet could have been made or driven into the two thousand ships that now sail the inland seas, if it had not been for woman. Colonel Millis, who has conceived and carried into effect many of these great engineering projects on the Great Lakes, my friend Mr. Wallace, who has built many of the two thousand or more ships that sail our waters, Mr. Goulder, who has claimed the credit of it all, would not have been here had it not been for woman. And yet they expect me, in a few moments, to toss this subject off in the form of a toast, as though it were a bauble, a toy balloon. (*Laughter.*)

I never have felt the impossibility of handling a subject, of meeting a problem, as I feel this one this evening. I am in the position somewhat of a very learned physician in England, who was lecturing to his class and received news that he had been honored by a high appointment by the Crown. He read the message and turned and wrote upon his blackboard this announcement : "Professor Blank has been appointed physician to

Her Majesty, Queen Victoria." A few moments later he was called out of the room, and on his return he found that same waggish student had added the words. "God save the Queen!" (*Laughter.*)

I pray that I may fare, this evening, in view of my ill deserts, better than the man who, in the early days of the telephone, happened into a country store and inquired of the storekeeper what that instrument on the wall was. He was told it was a telephone, and being told what it was for, asked if he might talk with his wife. He went to the telephone and he said, "Central, will you give me Sarah?" He put the receiver to his ear. Just at that moment a thunderstorm broke, and the lightning struck the wire. The man was thrown to the floor. He got up and said, "That is Sarah, I would know her anywhere." (*Laughter.*)

But this is not a subject for jesting, any more than it is for statistics. It is a serious subject, and so I acknowledge now that I am defeated, I acknowledge my inability to deal with this subject or to do it justice, either in five minutes or for that matter in five years. The truest thing that has ever been said is our old saying that "the hand that rocks the cradle rules the world." That same hand spans alike the future beggar and the future millionaire, the bishop and the burglar, the town clerk and the president. (I only wish that during some of the recent political disturbance which has agitated our country that hand might have performed that function upon a president and an ex-president.) That hand soothes our sorrows, from the first pin-prick that calls forth our infant cries, to the closing of our eyes when all our sorrows are done on this earth. We poor, feeble men delve for a few paltry dollars. That fair hand spends them for us, and in the spending gives to the dollars the only value they ever can have. That hand helps us in our needs, leads us out of our troubles, nurses us in our sickness, and cheers us through our lives. And most of all, that hand makes home the most sacred spot on earth.

On behalf of Cleveland, I welcome to the city the home makers and the happiness makers of foreign lands. On behalf of mankind, I ask you to drink a rising toast to God's greatest, fairest, best creation—Woman, Gentlemen, "The Ladies !" (*Applause,*)

The toast was drunk standing.

The **Toastmaster** (in English) :

Ladies and gentlemen, as we have gone around Cleveland today and seen the great ships and the great unloading plants, I would n't want our visitors to go away with the idea that that has been brought entirely by the shipbuilder and the manufacturer of machinery. We owe a great debt to our Government and its wise forethought and foresight in giving us the channels in which to navigate these large ships, and so use this vast machinery. And I want to just say one word of recognition, on behalf of the marine interests, to the engineering Corps of the United States.

It has been my privilege and pleasure for a number of years to know a great many men connected with the Engineering Corps of the United States who have had charge of these great waterways, not only on the Great Lakes but all over the United States. No finer body of men ever undertook great works, carried them through so successfully and so honestly, with such wise forethought, as that same body of gentlemen. And it gives me great pleasure to introduce to you Colonel Sanford, a member of that honored body, who is also a member of this Congress, and who will tell you something about the work of the Congress.

Lieut.-Colonel **Sanford** (in English) :

Mr. Toastmaster, ladies and gentlemen,

I have the honor and pleasure of bringing to this city of Cleveland, for the United States Government, the distinguished body whom you have with you now. About two years ago the Government made an appropriation for the holding in this country of the Twelfth International Congress of Navigation, the appropriation being worded in such a way that it was to cover the expenses of the meeting, and the expenses of transporting foreign delegates and members to visit works of engineering interest in the United States. The members of the Association, it is probably needless for me to state, as it has been stated to you before, are the leading engineers and persons interested in navigation improvements in the world. It is undoubtedly the most distinguished body of engineers that has ever visited this city. It includes in its membership more persons whose reputation for engineering achievements is worldwide than have ever been included in any body that has visited your city or that perhaps will ever visit it.

The question now arises, why were they brought to Cleveland? From the wording of the appropriation act I have just stated to you, it was evident that we could have taken them in any direction in this country, but we chose to bring them up here to the Great Lakes. We find on the Great Lakes the greatest volume of our commerce, of our water-borne commerce. We find the most remarkable results for the work that has been done. We find the greatest growth of cities. Right here in Cleveland we have perhaps the most remarkable instance of it, as the result of these works. Chicago is a larger city, but Chicago's greatness is not due entirely to the improvements that have been made on the natural condition of the Great Lakes system. Cleveland apparently owes nearly all of her wonderful growth to the work that has been done in improving the connecting channels of the Lakes, and incidentally of course in improving her harbour, though that was a small matter as compared with the other.

We read often of the wonderful results coming in foreign countries from great waterway improvements that have been undertaken. We read of the growth of Frankfort-on-Main, due to the canalizing of the Main, and its

growth has been tremendous, very wonderful. We read of the great increase of shipping at Antwerp, due to the harbor works; the same at Glasgow, the same at Hamburg; but I do not believe that there is any foreign city which has very much distanced the growth of Cleveland in the last thirty years, due to the improvements that have been made in the channels connecting Lake Superior with Lake Huron and Lake Huron with Lake Erie. Something like fivefold has been the growth of your population in the last thirty years, due almost wholly, it seems to me, to that cause.

I wish to thank your Toastmaster, and also Mr. Goulder, for the kind words that they have said regarding the corps to which Colonel Millis and I have the honor to belong. I feel that a great many of our members deserve that high praise; I am very glad to take it for granted that they all do. But I feel also that the compliment is not wholly a compliment to the Corps of Engineers of the United States Army. I feel that it is a compliment to the people all over the world who are working in the same lines, to the very people who are represented here. The work that is done by engineers is the kind of work that practically, perhaps, has the greatest influence in the progress of civilization of any kind. Every work that increases the amount of commerce or intercourse between peoples of different parts of one country or of different countries, that renders more economical the transfer of products and the cost of everything that we need, tends to our comfort, tends to our welfare, tends to lead us higher in civilization.

I will close, therefore, simply, as time is short, by thanking you on behalf on the Corps to which I belong, and thanking you also, and in the same measure, for all the engineers here represented. (*Loud applause.*)

The Toastmaster (in English) :

Ladies and gentlemen, I don't know whether you all realize that in this International Congress there are representatives from, I think, forty of the nations. As was said at the informal luncheon held in the Chamber of Commerce, this is a worldwide movement. It is not local, it is not entered into from any selfish motives on the part of any one nation. They all realize that it is a step forward. Any movement made to facilitate transportation affects the whole world. Probably some of these delegates here will realize, before they get through the Great Lakes, that the money spent by our Government is bringing the breadstuff of the great Northwest just that much nearer to the populations in their own countries. And it seems to me that the results of these conferences are so far-reaching that they can hardly be estimated. It shows that the nations are all working together in one common brotherhood for the good of humanity. And while we will not have time tonight to show our appreciation of the work that is being done by each individual nation, I would like to have the citizens of Cleveland, by a rising vote, show their appreciation of the work that is being done along this line by all the nations that are represented here in this Inter-

national Congress. We will rise and drink to « The amity of the nations, that are all working together to one common end, which in my judgment is to the betterment of humanity. » All rise.

(The audience rose and drank the toast standing).

I am now going to take advantage of my position as toastmaster and call upon a few of our guests to respond. They have very graciously consented, and I will now introduce to you the acting President of the International Association of Navigation Congresses, Professor V. E. de Timonoff of Russia.

Mr. V. E. Timonoff (in English) :

Mr. Chairman, Ladies and Gentlemen,

There is a great similarity in the general geographical conditions of some parts of Europe and the United States. In the northern part of Russia and in Sweden, there are great lakes, which are similar in size to the great Lakes of the United States. The navigation on the lakes of Europe is one of the oldest and has always been progressing. This progress followed two directions : the increasing of the size of boats and the improving of the connections of the lakes with the sea. Sweden has constructed, many years ago, the celebrated Gotha Canal and is now engaged in deepening this beautiful waterway which connects the lakes Wenern and Wetteren with both Baltic and North Seas. Russia has also done much to facilitate the navigation on her lakes Ladoga and Onega, and on the rivers uniting these immense waters with the Baltic Sea.

But the young America is ahead of old Europe as to the great lakes navigation, although it was only in 1855 that the barrier between Lake Superior and the lower Lakes was broken by canal locks to overcome the drop of 18 feet. Beginning in 1855 with 14,500 tons carried through the Soo Canal, the lake carriers reached 62,500,000 tons cargo through that Canal in the season of 1910, which are to be compared to the 36,000,000 of tons of the Suez, and to the estimate of some 11,000,000 for the Panama Canal after 10 years of operation. During the same time wonderful progress has been made in the construction of the Lake Ships and in the loading and unloading machinery. The figures just given to us by Mr. Harvey D. Goulder, of a cargo of 10,000 gross tons of iron ore loaded in 25 minutes and discharged in 3 hours and 15 minutes, of cargo of 320,000 bushels of wheat loaded in 2 hours and 40 minutes and discharged inside of 12 hours, of a cargo of 10,800 tons of coal loaded from cars into the ship in 5 and a half hours and discharged in 13 hours—will always be present in our minds.

The United States understood fully how to utilize in a perfect manner

the admirable natural resources of the American Great Lakes, and the foreign members of the International Congress of Navigation, can but be amazed by the dimensions of the Lake ships, by the excellent equipment of the Lake Harbors, by the intensity of the Lake traffic, and by the development of the Lake Cities.

Among the latter the City of Cleveland had a fascinating attraction for the members of our Body because of its marvellous growth during 50 years from the 43rd to the 6th in the United States, and because of the progressive spirit of its citizens in commercial, industrial, technical and municipal matters.

We are highly wined in the results of our visit to Cleveland with its wide diversity of manufacture, among the foremost of which are steel ships, hoisting and conveying machinery, iron and steel, wire foundry and other products of such great importance to navigation,—to Cleveland from which about 80 % of the fleet carrying the iron and coal of the Great Lakes is operated—to Cleveland where have been developed and made the principal devices for unloading iron ore and loading coal.

Our stay here was short, but through the kindness of our hosts we have been shown many things of highest interest. We saw a beautiful harbor with the excellent appliances for handling iron ore and coal. We saw iron works which, owing to their situation, as to ore, coal and lime, districts, and to their modern plant, furnish iron at the lowest prices. We saw numerous perfectly working moveable bridges on the Cuyahoga River, and one of them the biggest in the world. We saw the erection of an imposing high-level viaduct. We saw the remarkable example of cheap street car transportation. We saw the creation of a group of public buildings which will form an architectural whole equal in beauty to the best ancient and modern models of the kind. We saw very fine public parks and play grounds.

The members of the 12th International Congress of Navigation are full of all these impressions received in Cleveland and they feel deeply grateful to those who extended to them the hospitality in this city.

On behalf of the Permanent Association of the Congresses of Navigation, I have the honor to convey our heartiest thanks to the Cleveland Reception Commission, with its Chairman, Mr. H. H. Johnson, Vice-Chairman, Col. John Millis, to the Honorable Newton D. Baker, Mayor, and to Mr. Harry C. Coulby, Chairman of this splendid dinner offered to us in the charming Country Club of Cleveland. (*Loud applause.*)

The Toastmaster (in English) :

The next speaker whom I will introduce to you is Mr. J. Richald, Principal Engineer of Bridges and Roads, of Belgium, Professor at the University of Ghent and Secretary General of the Permanent International Association of Navigation Congresses.

Mr. J. Richald, then addressed the meeting as follows (in French) :

Mr. President, ladies and gentlemen :

The General Organizing Commission of the Twelfth Congress has had the happy inspiration of arranging an excursion to the fine State of Ohio, with the generous co-operation and hospitality of the Chamber of Commerce and authorities of Cleveland, in order that we may admire the grandeur and prosperity of this magnificent part of the United States.

On behalf of Belgium, the cradle of Navigation Congresses, I wish most particularly to express our gratitude to all the organizers who have earned our warmest thanks.

Allow me also, as General Secretary of the Association, to specially congratulate and thank one of the Members of the General Organizing Commission and of the Executive Committee, namely Lieutenant Colonel J. C. Sanford.

In the first place I congratulate Colonel Sanford on having been chosen to fill the important and difficult function of General Secretary of the Twelfth Congress, a post which now carries with it, in accordance with the statutes of our Association, the title of "Life Member" of the Permanent International Commission of Navigation Congresses. (*Applause.*)

My thanks are also due to Colonel Sanford for the inestimable service he has rendered to the International Work of Navigation Congresses, by occupying himself for several months with zeal, devotion and intelligence, to the remarkable organization of the Twelfth Congress, and for having procured for us, amongst other privileges, the satisfaction of visiting not only the great manufacturing city of Cleveland, but also of seeing the hydraulic works which have been carried out in the port of this city, and the improved plant which is installed in connection with its exploitation.

Among the remarkable things which we have been privileged to admire this morning, allow me to mention some of the most important, namely, the breakwater built by the United States Government, the coal dumping machines and the cranes for unloading iron ore.

These works and powerful plant have astonished all the members, and I must again address to the President of the Chamber of Commerce and to the authorities of Cleveland, as also to the members of the General Organizing Commission of the Twelfth Congress, our intense gratitude and warmest thanks, and best wishes for the increased prosperity of the city of Cleveland. (*Prolonged applause.*)

The **Toastmaster** (in English) :

I now have pleasure in introducing Mr. Tincauzer, delegate from Germany.

Mr. **Tincauzer** then spoke, in German, the following being the translation :

Mr. Toastmaster, ladies and gentlemen :

The fame of American hospitality is world-wide. I have already been privileged to enjoy it, when I came over to America in my capacity as member of the "Board of Consulting Engineers for the Panama Canal", and stayed several months in this country. During my last crossing I described the geniality of Americans to my compatriots, and excited their interest to the highest degree. But all our anticipations have been largely exceeded. In all the cities we have visited we have received the most cordial welcome, and we have had this welcome extended to us also in this fine city of Cleveland. We have not only been shown engineering works consisting, amongst others, of a remarkable plant for loading and unloading which is unique of its kind, but we have also been shown the magnificent buildings in the city itself. Everything we have seen has excited our admiration. There have been so many things to admire that we have not even had time to put on suitable clothes for this magnificent reception which has been organized in our honor by the Country Club of Cleveland. But, Ladies and Gentlemen of America, please do not look upon our outer garb but consider rather what it envelops; namely hearts full of gratitude for all that has been done for us. We shall never forget our impressions.

I conclude in wishing that the city of Cleveland, which owes its prosperity to its navigable waterways, may continue to progress; and that Cleveland and its Country Club may grow and prosper together. (*Loud applause.*)

The **Toastmaster** (in English) :

The next speaker is from the Argentine Republic, Mr. Octavio M. Figueroa.

Mr. **Octavio M. Figueroa** (in English) :

Mr. Toastmaster, ladies and gentlemen :

The extreme cordiality and hospitality shown to me has been no exception to that with which every stranger meets in this country. In the endless repetition of kind words and the overwhelming measure of genial entertainment which has been thrust upon us, I have experienced not only hospitality but considerate and thoughtful kindness for which I must ever be grateful. I can find it in my heart even to forgive the newspaper reporters. The three weeks I have spent in this country seem to be three years in actual work, for in them I have lived through all American engin-

earing history, and you will understand how long and fruitful an experience has been added to my life in the few weeks through which I have moved among you.

I have seen, ladies and gentlemen of Cleveland, part of your city, and I must say it is a very beautiful one. Besides, its port, with its wonderful plants and hoisting machines, makes it unique.

I am representing here perhaps the youngest country, according to its population. It is only a country of seven million inhabitants, the Argentine Republic, and I am sorry to say it is a very, very large country. It is like France and Italy, Austria Hungary, Germany, Spain, Portugal, Norway, Sweden and Denmark put together. And you must understand that we are very few, only seven millions, for such a large country. We have not done very much in my country, and you cannot expect it, we could not expect it today.

The future of your state, Ohio, is well assured by reason of the character of the northern European population, its great natural resources and manufacturing facilities of power, fuel and raw material, and its very healthy climate. As I said before, in Boston, we are leaving America, all we foreign delegates, members of the Twelfth International Congress, very much obliged for all the kindnesses shown to us, and I do not really suppose that ever an International Congress has been welcomed as you have welcomed us. I thank you. (*Loud applause.*)

The **Toastmaster** (in English) :

The next speaker I will present to you is Dr. Hermann Matheusche, of Austria.

Dr. **Hermann Matheusche** (in English) :

Mr. Toastmaster, ladies and gentlemen :

The closing of the session of the International Congress of Navigation was held in Philadelphia May 29th, and still we are together. Had n't we finished and discussed our problem? Yes, we had, but our American friends, I hope I am right to call them our friends, wanted to show us their improvements, they wanted to show us the industrial plants, they wanted to show us the waterways, the railroads and so on. Therefore we are keeping together as a sightseeing and inspecting congress. We know the several interesting points in the different parts. We have seen, in the last days, the fine waterway on the Hudson. We saw the electric plants at the Niagara, we saw the Niagara Falls too. When we compare the Niagara Falls and the long time that nature wanted to make the big cañon there, and the short time your engineers want now to make a canal, and to make especially the big Panama Canal, I must say you have

certainly a very fine engineering corps. And if you could do all this in such a very short time, and if we had the pleasure to admire everywhere the great progress and the success you have had, that is your reason for it — you have everywhere the right man in the right place. The land is full of resources. One had ideas, another came with the money, and last and not least, you have excellent engineers.

I think the best way to tender our thanks for the hospitality we have found in the United States, and especially here in Cleveland, is to toast the future progress and the future success of your country, and the health of American engineers. (*Loud applause.*)

The **Toastmaster** (in English) :

The next speaker whom I will introduce to you is Monsieur Ferdinand Farjon, of France.

Mr. **Ferdinand Farjon** (in English) :

Mr. President, mesdames et messieurs, you will permit me to speak in French.

Mr. **Farjon** then continued as follows (in French) :

Mr. President, ladies and gentlemen,

I have asked your permission to speak in French. I am encouraged to do so by your gracious attention in printing the menu in French for the superb banquet which has been given to us. If I ask this permission it is because it would be so difficult for me to give expression in any other way to the admiration which my friends and I have felt during the two weeks we have been privileged to witness the marvels of nature of the United States, and the marvels which have been created by Man. Admiration for your immense lakes, which are the antechamber or the continuation of the Atlantic, according to whether we look at them from the west towards the east or vice versa; admiration for your engineers whose enterprising spirit and prolific audacity have created the marvellous mechanical installations of your ports; admiration for the fine city of Cleveland which we have visited with so much pleasure, a city whose name was almost unknown to our fathers, and whose prodigious development is now taking place to-day amidst its reposeful surroundings of verdure.

I am compelled also to resort to my native tongue in order to express our gratitude to the Chamber of Commerce, to the authorities of the city, and to our worthy hosts this evening for their sumptuous and cordial welcome.

It is a great honor to me to speak before such a distinguished assembly. I am hardly entitled to do so, since I am neither an engineer nor an expert, but merely the humble representative of a commercial corporation; so that I should say, "Non dignus sum intrare...." However, may I be allowed to observe that without commerce we should not require navigable waterways, nor ports, and consequently no engineers to construct them and work them. There is, therefore, a very close bond between commerce and civil engineering, and this is my excuse for speaking before this assembly of engineers and academy of experts, on behalf of the French section of the Twelfth International Navigation Congress.

Mr. President, ladies and gentlemen : I raise my glass to drink your healths, and to drink to the increasing prosperity of your noble city, and I trust that the ships which cross the Atlantic Ocean and the blue waters of your lakes, and which seem to be so many hyphens to unite the nations of the two continents, may go on increasing in number, in size, in comfort, and in swiftness. (*Loud applause.*)

The **Toastmaster** (in English) :

The next speaker is Dr. Z. D. Kohanyi, Royal Hungarian Chief Naval Inspector.

Dr. **Z. D. Kohanyi** (in English) :

Ladies and gentlemen,

I am really sorry I must detain you, but I am called on, and you are all in a hurry, and I will be very quick. I told once that we had come over here to learn something, and I will tell you two things we have learned today. One is that Cleveland is a great city, and the other is that Baedeker has no idea of America, because, if you read Baedeker, you read a lot of English expressions translated into American. For example, he says you must never use the English word "station" in America, you must say "depot". You must not say "carriage", you must say "a cart". But he forgot to explain one thing, what a harbor inspection is, that it is nothing else than a social hop. I assure you that the next edition will be a better one — I will take care of that.

Another thing I was rather anxious to know was why American ladies always take away our ladies, why we always have luncheon and dinner without them. I was anxious to know the reason why, and so I disguised myself today, and I got in at the ladies' lunch. Well, it was very simply done, in this way — everybody took me for a lady — and I will tell you now why ladies insist on having luncheon alone without any men. The luncheon was quite nice. They had soup, and fish, and vegetables, just the same as we do, and they talked a good deal, just as we do. Afterwards

came the secret — you know what it was — they delivered a very nice speech about universal suffrage. They forgot I was there, because I was disguised. Of course, everybody stood up and cheered. I did n't, and I was turned out, I had to go back to the gentlemen without the ladies. I think our European husbands will take care of their ladies now, and not allow them to have luncheon with American ladies any more. I am afraid they will turn everything in Europe upside down.

Well, as I had the pleasure to have a luncheon with the American ladies, of course you don't expect me to deliver a nice speech about American hospitality. I think that, if there is a nation in Europe that could speak about American hospitality, it is the Hungarian nation. I think we owe it to erect a statue of Cleveland. If I could bring this statue here, this statue could tell you far more about American hospitality than we can do here, because American hospitality does not consist only in giving you nice luncheons and dinners, but something more. I am not eloquent enough to explain to you and to tell you what I feel at this moment. I think, if anybody is anxious to know it, I will ask him to go down and ask the statue there, and it will tell you that Americans gave once and always a home for men who were without any home at all, and this statue could tell you what he thinks this very moment, and what he wishes to you Americans. And behind this statue is a whole nation which says the same.

We wish you Americans to proceed to grow big, to develop yourselves, to be the first of all nations, because we know very well that in developing you will always remain what you have been always, the bulwark of liberty and the bulwark of peace. (*Loud applause.*)

The **Toastmaster** (in English) :

The next gentleman I will introduce to you is Professor Luigi Luiggi, Inspector General of the Royal Italian Engineers.

Professor **L. Luiggi** (in English) :

Mr. Chairman, ladies and gentlemen,

On behalf of my Italian colleagues, members of the International Congress, and I might say on behalf also of all the members of the International Congress, since we landed this morning in this beautiful city of Cleveland, we feel ourselves almost in a wonderful land, a fairy land. We have admired very much your busy harbor, your excellent machinery for handling goods. We have admired in the afternoon your marvellous city, and the beautiful parks, and the beautiful houses all round and about the parks. For this we thank you most cordially.

But we have admired something else. There are among us to-night some princes of finance, some princes of commerce, some princes of

industry. I always thought that those gentlemen only live for business, that they thought of business when they were awake, and they dreamt of business when they were asleep, if they slept. We have found instead that they have time for leisure, and they can give this time in the most cordial way to perfect strangers, to people who they know have come here to study and to admire what is good. These gentlemen have given us all their time today to take us around to see the town, to see your harbor, to see your parks. Thanks to them, we go away with sorrow from this beautiful town, with the greatest impression and the greatest admiration for your city. From your heart this has all gone deep in our hearts, and from our heart we tell you thanks, a thousand times thanks for all you have done for us. And as there are here some ladies of Cleveland who speak Italian, the language of Christopher Columbus, whom we all honor, and as there are also some gentlemen who speak Italian very nicely, allow me to speak what I have said in Italian.

(The speaker repeats his expression of thanks in Italian).

And I wish a most prosperous future to all these princes of commerce, of industry, and all the ladies that have been so kind in taking all the ladies of the Congress around the city of Cleveland. I wish implicitly the prosperity of the city of Cleveland. I beg of you to raise your glasses to the prosperity of the city of Cleveland.

The **Toastmaster** (in English) :

We have got to the farther East for our next speaker, to that land of flowers, Japan. I call on Captain Hiraga, of the Japanese Navy.

Captain **Hiraga** (in English) :

Mr. Toastmaster, ladies and gentlemen,

I simply wish to express my sincere and heartfelt thanks to you for your warm welcome extended to us today here in Cleveland. I am delighted to have the opportunity of visiting this great city, the home of Commodore Peary, Japan's admiration of whom is great and sincere. Our friendship for the United States began with the visit of Commodore Peary to our shores, and it will not decrease in the future, as the past has shown. And to thank you again, and to pay our respects to Commodore Peary, I wish to express only one thought for the home of Peary, and just a single one for this great city of Cleveland — Banzai to you! (*Loud applause.*)

The **Toastmaster** (in English) :

Our next speaker is the ex-Minister of Navigation of the Netherlands, Mr. van der Sleyden.

Mr. **Van der Sleyden**, spoke as follows (in French) :

Mr. President, ladies and gentlemen,

The Dutch were among the first to set foot on American soil, and the Government of the United States has had the tactful attention to remind us of what Hudson did in 1609 with his ship "De Halve Maan." (The Half Moon.) He was the first to navigate the river which bears his name, and on Thursday last during our excursion we were shown an exact reproduction of this ship which was given by the Netherlands three years ago on the occasion of the tercentenary fetes. At the same time the band played the Dutch National Hymn.

And if I remember with pride that for centuries the relations between the two countries have been most cordial I earnestly hope that they will continue to remain so in the future. Again to-day our welcome by the city of Cleveland has been of the warmest, and I thank everyone present for the splendid reception which has been given to us this evening. May I accompany this wish with another? Namely, that the fleet which is already so numerous and navigates on Lake Erie may, in the near future, have access to a waterway which will lead it direct to the ocean, so that the prosperity of this magnificent region may be increased. (*Loud applause,*)

The **Toastmaster** (in English) :

The following speaker is Mr. Emile de Hoerschelmann, delegate of Russia.

Mr. **Emile de Hoerschelmann**, was the last speaker, and expressed himself as follows (in French) :

Mr. President, ladies and gentlemen,

When one travels in the United States one gathers so many new impressions that it is difficult to collect one's thoughts at first. It requires a certain time for all to sink in, but there are impressions which strike one right away by their irrefutable evidence and originality. This is the kind of impression we have received from the important city of Cleveland. All the world knows the old Latin saying "Variatio delectat." "Variety

pleases", and the city of Cleveland is the living exponent of this dictum. Everywhere we find astonishing progress of industry, and at the same time we are charmed by the wealth of vegetation which has gained for the city of Cleveland the title of "The Garden City." A very true appellation, as we have been able to see for ourselves on the way to this banquet. A city symbolises the two phases of human existence;—the two elements which are necessary to man in his ordinary life. On the one hand the assiduous work of industry and of all its branches of science which are necessary for its development; and on the other hand the beautiful gardens and plantations which are so reposeful, soothing, and recuperative. On behalf of the Russian Members of the Congress I raise my glass to the prosperity of the hospitable, industrial, and also charming city of Cleveland, and wish it ever increasing prosperity in the two ways which it has already followed with so much success. Long live the city of Cleveland! (*Loud applause.*)

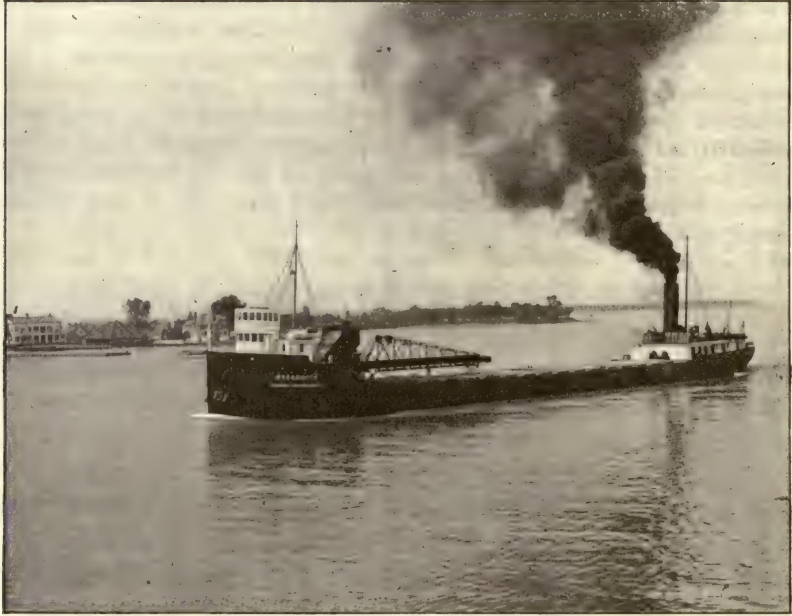
It was about eleven o'clock when the speeches terminated, and the members of the Congress returned to the "Northland", which was to sail at midnight for Detroit. This second part of the journey only covered 106 miles, which was to be traversed at night, as in the first part of the journey.

The members left Cleveland with an excellent impression which was due to the very real interest they took in all they had seen, to the entertainment, which had been offered to them, and especially to the great cordiality and welcome which had been vouchsafed to them. The success and attraction of this excursion far exceeded the expectations of the National Organizing Committee. The Local Commission and particularly its President, Mr. H. H. Johnson and its Vice-President, Colonel John Millis, are to be warmly congratulated.

Cleveland-Detroit-Sault Ste Marie.

With a view to the entertainment proposed for June 11, two members of the Detroit Entertainment Committee, namely Mr. Wm. Livingstone, President of the Lake Carriers' Association, and Col. Curtis McD. Townsend, Corps of Engineers, U. S. Army, in charge of the Detroit Engineer District, had joined the "Northland" at Cleveland. Lieut. Col. Wm. P. Anderson, Chief Engineer, Department of Marine and Fisheries, Canada, was also on board, having accompanied the party from Philadelphia.

At 6 A.M. the "Northland" arrived at Amherstburg, Ontario, at the mouth of the Detroit River, which is 27 miles in length, and connects Lake St. Clair with Lake Erie. Detroit is 4 miles below Lake St. Clair. The river at Detroit is only about 1/2 mile wide



Ore Carrying Steamer off Windmill Point, Lake St. Clair.
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and very deep, while at its mouth it is about 10 miles wide. The lower 12 miles of the river were originally very difficult of navigation and at the worst point, known as Lime Kiln Crossing, the depth, before improvement, was only from 12 1/2 to 15 feet over a bottom of solid rock. A channel through this part of the river, known as the Amherstburg channel, and lying wholly in Canadian waters, has been excavated by the United States Government at a cost of \$ 4,465,500. This channel has a depth of 21 feet and a width of 600 feet. It contains a number of bends. In 1907 a second channel known as the Livingstone Channel, 10 miles in length and on an absolutely straight line, was begun for the use of down-bound vessels exclusively. This

channel, which is nearly completed, will have a depth of 22 feet at extreme low water and a least width of 300 feet, in its upper and more costly portion, and 800 feet thence to deep water in Lake Erie. Its estimated cost is \$ 6,805,000. Its value will be seen when it is considered that the commerce of the Detroit River, for 1910, is estimated at 73,526,600 tons, carried in 33,638 vessels, having a registered tonnage of 58,821,282 tons. (It is proposed to later increase the 300 feet width to 450 feet, and work on this has begun).

The most interesting part of the work is a section of the upper portion of the channel, where a very large part of the excavation was through solid rock. Here an enormous cofferdam was built and a section of the river bed, 5,500 feet long and 1,200 feet wide, was unwatered, to allow the excavation to be made " in the dry ".



Waterfront of Detroit.

Provision had been made to enable the members to visit the Livingstone Channel work from Amherstburg, under the direction of Major Lamb, of the Department of Public Works of Canada. Owing to the early hour at which the steamer arrived at Amherstburg, only about 60 members of the party cared to take part in it. The members were much interested in the view of the dry work as seen from the south dam; also in the operations of the contractors' plant, consisting of dredgers, drill boats and derrick scows, then working in the channel.

The Northland" then left for Detroit, where it arrived at 9 A. M.

The Mayor of the town, Mr. **Wm. B. Thompson** then boarded the steamer with other members of the Local Entertainment Committee and after having been presented to Mr. de Timonoff and numerous members of the party on deck, he addressed them as follows in English.

Mr. President and Gentlemen,

It affords me a very great pleasure and honor this morning to extend to you greetings and the hearty and sincere welcome on behalf of the people of the City of Detroit.

We consider it an honor to have such a distinguished body of men, representing so many different countries, pay us a visit. Let me assure you that you should not feel as strangers in our city, because I want you to know that your friends, descendants of the different countries you represent, have done a great deal to give Detroit the standing that it has in the commercial and financial world. I think I can be safe in saying that at least eighty per cent of Detroit's population is composed of foreigners or descendants of foreigners, and I want to assure you that they are numbered among our best citizens. (*Applause.*)

Perhaps I might say that your convention, just recently held, means a great deal to the civilized world, and we will get the benefits of its results in the near future.

I trust that you will enjoy yourselves on your brief visit. Once more, on behalf of the 600,000 people of this city, whom I have the honor to represent, I extend to you their congratulations and best wishes for an enjoyable trip and a safe return. I thank you. (*Loud applause.*)

Mr. **de Timonoff** then replied as follows in English :

Mr. the Mayor, Gentlemen,

It is an honor and also a pleasure for me to respond on behalf of the members of the Permanent Association of Navigation Congresses to the words of welcome addressed to them by the distinguished Mayor of the City of Detroit. We came from many countries to see what America has done for waterways and for her navigation, and we know that we are now on a river which not only is a magnificent waterway, but which carries the greatest tonnage in the world. This tonnage is carried on the ships perfectly adapted to the special conditions under which they work and constantly progressing as to their carrying capacity or to their equipment. We know that the first steam barge which marked the evolution from sail to steam on the Great Lakes was built only in 1869 and carried, on draught of water then obtainable, something over 1,000 tons and we admire the modern Lake-ships with their carrying capacity on present draught of about

12,000 tons and on less than 20 feet draught — 14,000 tons. We know how the water carriers of the Great Lakes combine their efforts with those of the Governments of the United States and of Canada to improve continuously the Lake-navigation conditions, working out more and more the problem of cheap water transportation and taking advantage of nature's generous provision. We are sure therefore of the further growth of the Great Lakes commerce and we wish it for the benefit of this country in general and of city of Detroit in particular — of the city of Detroit, famous as one of the most beautiful on the American continent, as the busiest on this side of the ocean and occupying a most prominent rank in the United States in respect to the value of its manufactured products. We sincerely hope that this rank not only will be maintained in future but that the intelligent activity of the people of Detroit will gradually rise more and more this city to a still higher place in all respects.

In conclusion, let me, Mr. the Mayor, address to you on behalf of the nations represented in our Permanent International Association of Navigation Congresses our heartily felt thanks for your kind words of welcome.
(Loud applause.)



Passenger Steamer "Tashmoo" entering United States Ship Canal,
St-Clair Flats.

After these speeches, the members were taken on a tour of inspection of the city by means of specially provided trolley cars. A stop of some length was made at the extensive plant of the Ford Motor Co. and a photograph of the group was here taken. It should be said here that the great increase in the population of Detroit, is largely due to the establishment of factories making automobiles or accessories for automobiles.



Freight Steamers, St. Marys Falls Canal.

The party returned about 1 P. M. to the "Northland" which left Detroit for Sault Ste. Marie, Michigan (387 miles distant), which they did not expect to reach till the next day. The route lay through the upper part of the Detroit River with magnificent scenery, Lake St. Clair, the St. Clair River, then Lake Huron, which was crossed cheeply during the night, and then St. Mary's River. As the steamer entered the St. Clair River she passed through the St. Clair Ship Canal, where, by means of two long parallel piers, a deep dredged channel through the St. Clair flats is maintained.

Early in the morning the "Northland" entered the St. Mary's River, about 65 miles from Sault Ste. Marie, and in passing through the River the members were much interested in the Government works of improvement at many points for the purpose of securing a channel navigable by the largest lake vessels.

At 10 A. M. a meeting of the members of the Permanent International Commission, who were on board, was held in the smoking room. The party was to be divided at Sault Ste. Marie and several delegates were leaving American soil to take part in the Canadian excursion. It was decided therefore to convene a meeting of the Permanent International Commission before separating. We give below the minutes of the meeting in which it was resolved to send telegrams of thanks to the President of the United States, to the Mayor of Philadelphia, to Brigadier General C. W. Raymond, and Brigadier General W. H. Bixby and to the Hon. J. Hampton Moore, M. C.

Meeting of the Permanent International Commission of Navigation Congresses, on June 12th, 1912.

on board the steamer « Northland », during the excursion on Lake Huron.

MINUTES

The meeting was opened at 10 a. m. by Mr. V. E. de Timonoff, acting President of the Association.

The following were present :

Messrs de Timonoff, Richald, von Coels von der Brügghen, Bubendey, de Thierry, de Kohanyi, Vanderlinden, Sanford, Corthell, Brockmann, Chargueraud, Boutteville, de Joly, Yorke, Sanjust di Teulada, Matsumura, de Hoerschelmann, Kleiber.

Mr. de Timonoff, (in French). — I have taken the liberty of convening you here, Gentlemen, in order that we may come to an understanding regarding procedure. The Congress excursions will conclude in a few days, and we shall soon part company. I think it is our duty before leaving the United States, where we have been so hospitably received, to thank the various people who have devoted themselves particularly on behalf of our Congress. With your permission I propose to send various telegrams in your name to the following : His Excellency President Taft, General Bixby, General Raymond, and Messrs. Hampton-Moore and Blankenburg. (*Carried unanimously.*)

TEXTS OF THE TELEGRAMS :

To His Excellency WILLIAM H. TAFT,
President of the United States, Washington.

On behalf of the Permanent International Commission of Navigation Congresses assembled in its last meeting on the territory of the United States, I have the honor to convey to your Excellency the expression of deeply felt gratitude for all the kindness shown to the Members of the Twelfth International Navigation Congress by the Government and the people of the United States and especially by your Excellency as Chief Patron of this Congress and Honorary President of the Local Organizing Commission.

Professor DE TIMONOFF,
Acting President of the International Association
of Navigation Congresses.

To General BIXBY, and General RAYMOND,
and Messrs. HAMPTON MOORE, and BLANKENBURG.

On behalf of the Permanent Commission of Navigation Congresses assembled in its last meeting on United States territory I have the honor to convey to you the expression of our deep gratitude for the part you have taken in the work of the Twelfth Congress.

Professor DE TIMONOFF,
Acting President of the International Association
of Navigation Congresses.

Mr. de Timonoff, (in French). — Our thanks are also due to Mr. Corthell, who has carried on an active propaganda during ten or twelve years to obtain the permission of the United States Government to hold one of our Congresses in that country. Mr. Corthell has finally succeeded. Our colleague has been most useful in arranging for the reception of the members of the Congress at New York, and he has been most active during the meetings and the excursions. He has rendered services to the Association which deserve our most grateful thanks. (*Prolonged applause.*)

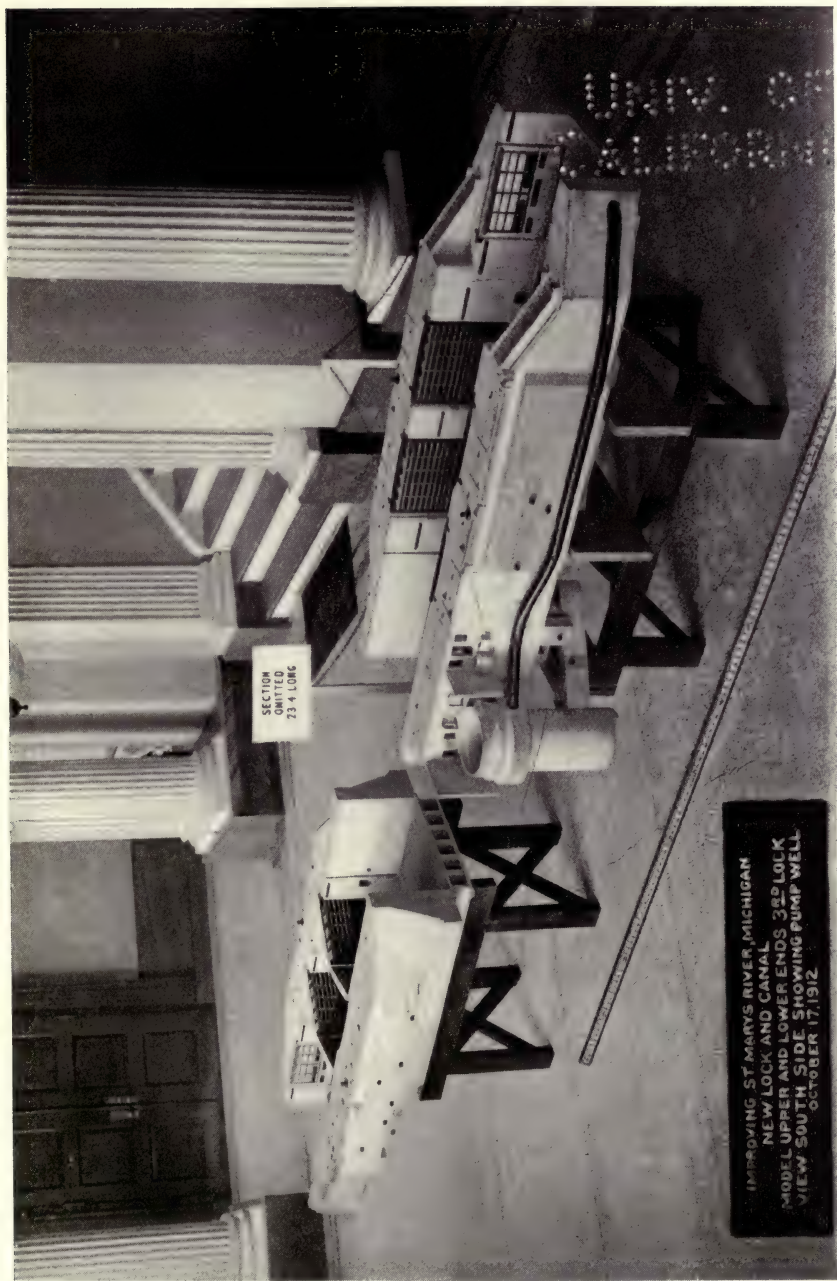
Our thanks are also due to Lieutenant-Colonel Sanford, who has been good enough to undertake the important role of General Secretary of the Congress. I know by personal experience how arduous, delicate and complicated such a mission is, and Mr. Sanford has earned the congratulations and gratitude of the whole Association. (*Prolonged applause.*)

I now have to submit to you a point regarding the speeches which are to be made during the final excursion. The Members of the Congress are about to divide into two distinct groups, one going towards Chicago and the other towards Canada. Unfortunately I cannot personally accompany both these groups. In order, therefore, to avoid all confusion I will ask you to be good enough to now appoint the members of the Commission whom you would like to act as intermediaries between the Congress and the local authorities.

Mr. de Thierry, (in French). — I second this proposal.

After an exchange of views the Commission requests Messrs. de Hoerschelmann, Van der Sleyden, and Kleiber, to undertake the speeches during the excursions to Chicago, and Messrs. von Coels von der Brügghen, and Chargueraud to undertake the speeches during the excursion to Canada.

Baron von Coels von der Brügghen. — I wish to thank Mr. de Timonoff for having undertaken the difficult and delicate task of presiding over the Association during the meetings and the excursions. Mr. de Timonoff



SECTION
LIMITED
23 x LONG

IMPROVING ST. MARYS RIVER, MICHIGAN.
NEW LOCK AND CANAL
MODEL UPPER AND LOWER ENDS 3RD LOCK
VIEW SOUTH SIDE SHOWING PUMP WELL
OCTOBER 17, 1912

ST-MARYS FALLS CANAL, MICHIGAN. NEW LOCK AND CANAL
Model upper and lower ends 3rd Lock, view South Side Showing Pump Well.

TO THE
LIBRARY OF THE
CONGRESS



Freight Steamers, St. Mary's Falls Canal and River, Mich.

Photograph by Young Lord & Rh.d's.

has done his work brilliantly, and has earned our general friendship, and has contributed largely to making the Association appreciated in the United States. In short, I will say, since we are in America, that Mr. de Timonoff is "the best President of Congress in the world!" (*Applause.*)

Mr. **Chargueraud**, (in French). — On behalf of the French delegation I wish to associate myself with the praise which has just been bestowed upon Mr. de Timonoff, for the successful way in which he has represented the Association during the Congress. (*Applause.*)

Mr. de Timonoff then thanked the Commission for the help he has received from it in carrying out successfully the work of the Twelfth Congress, and for the gracious remarks which have been made about him by Messrs. von Coels von der Brügghe and Chargueraud.

The meeting concluded at 10.30.

The General Secretary,
J. RICHALD.

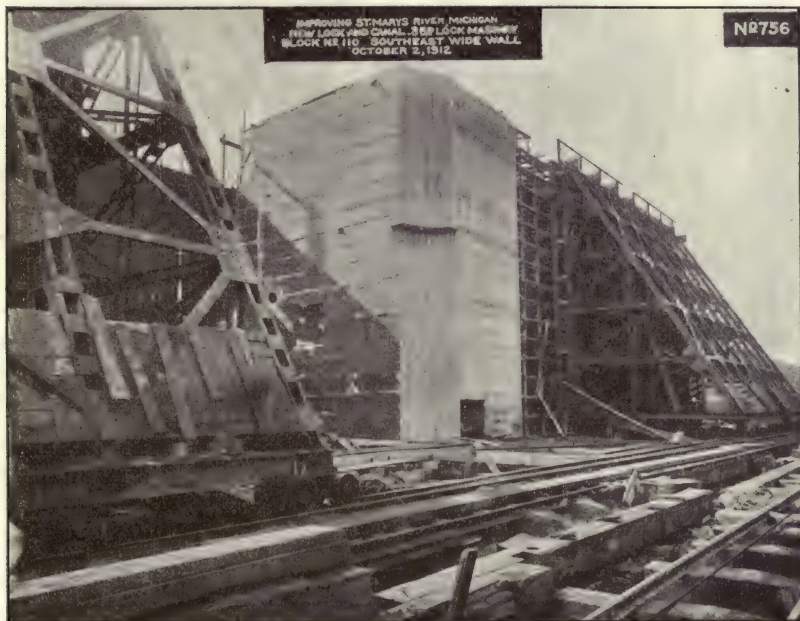
The Acting President,
V. E. DE TIMONOFF.

The Steamer "Northland" arrived at the wharf at Sault Ste. Marie, Michigan, a short distance below the foot of the American Canal, at about 11.30 A. M.



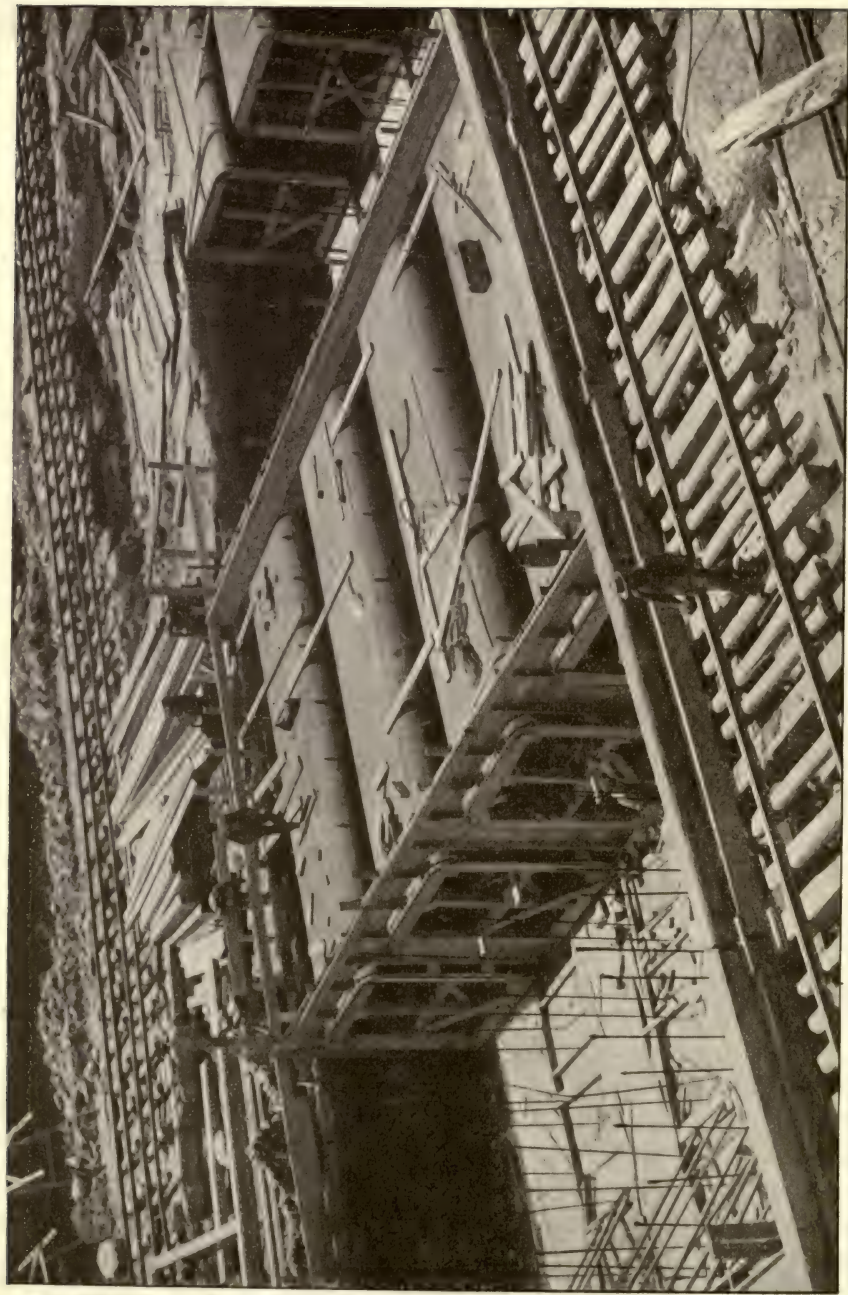
Steamers in the Lock, Sault-Sté-Marie, Michigan.

Two large locks are used at this point by navigation from the great lakes on the American side and a third lock of greater size is in course of construction to cope with the constantly increasing traffic.



St-Marys Falls Canal, Michigan. New Lock and Canal, 3rd lock Masonry.
Block no 110. South-East wide Wall. October 2, 1912.

The party was very much interested in the work of the lock under construction and they were enabled to inspect its operation by means of a model. After this those of the party who were to take the Canadian trip, took a ferry boat for the Canadian side where they joined the s. s. "ASSINIBOIA". The remaining members of the party boarded the steamer "MACKINAC" for a trip around the canal, which connects lake Superior with Lake Huron and which contains the Sault Ste Marie locks. Mr. L. C. Sabin, United States Assistant Engineer, in local charge, and Colonel Townsend, of the United States improvement works, conducted the party, the steamer having been placed at the disposal of the members through the kindness of the United States Revenue Cutter Service.



St-Marys Falls Canal, Michigan. New Lock and Canal. 3rd Lock Masonry forms for filling Culverts, ready for Pouring, June 7, 1912.

The steamer locked up through the canal to the river above, examining the construction of the canal en route. Returning, a brief stop was made to inspect the movable dam. This is an emergency dam, which, in case of an accident to the lock gates, will close two channels each 108 feet wide in the clear and 25 feet deep. The steamer then locked down through the Weitzel Lock and returned to the "Northland".

The St. Marys River, connecting Lakes Superior and Huron, was impracticable for through commercial navigation until 1855, when the State of Michigan, aided by the United States Government, constructed a canal 1 1/2 miles long, with two locks, so that vessels might pass the St. Marys Falls or Rapids at the head of the river, giving an available depth of about 11.5 feet. Afterwards the United States Government took charge of improving this canal and the various shoals in the St. Marys River, and in 1881 opened the Weitzel Lock. The dimensions of this lock are 515 feet long, 80 feet wide, narrowed to 60 feet at the gates, with 17 feet depth at the mitre sills at mean lake levels, and arranged for an average lift of 18 feet.

A great increase of commerce followed the opening of the Weitzel Lock and this lock soon proved insufficient. An additional and larger lock was therefore begun on the site of the 2 locks built by the state of Michigan and was opened in 1896. Its dimensions are 800 feet long, 100 feet wide, 21 feet depth in mitre sills at mean lake level, lift 16 to 21 feet. This is known as the Poe Lock. At about the same time the Canadian Government began the construction of a canal and lock on the Canadian side and this was opened in 1895. The dimensions of the lock are 900 feet long, 60 feet wide and 22 feet deep on mitre sills.

Owing to the enormous increase in commerce in and out of Lake Superior, which in 1910 reached over 62,000,000 tons of freight, and to the desire of vessel owners to increase the draught so far as possible, the United States Government decided, in 1907, to construct a new canal and lock with a depth of 24 1/2 feet. The lock can be about 1350 feet long and 80 feet wide. The construction work is now proceeding rapidly.

Since 1855 extensive improvements have also been in progress in the channel of the St. Marys River below the locks, where navi-

gation was obstructed by shoals of sand, clay, boulders, sandstone and limestone rock. The United States Government has expended about \$ 8,000,000 in the river improvement, exclusive of the canal, and on the canal and existing locks has expended about the same amount. The new canal and lock is estimated to cost \$ 6,200,000. The Canadian Government has expended about \$ 5,000,000 on the Canadian Lock and approaches.

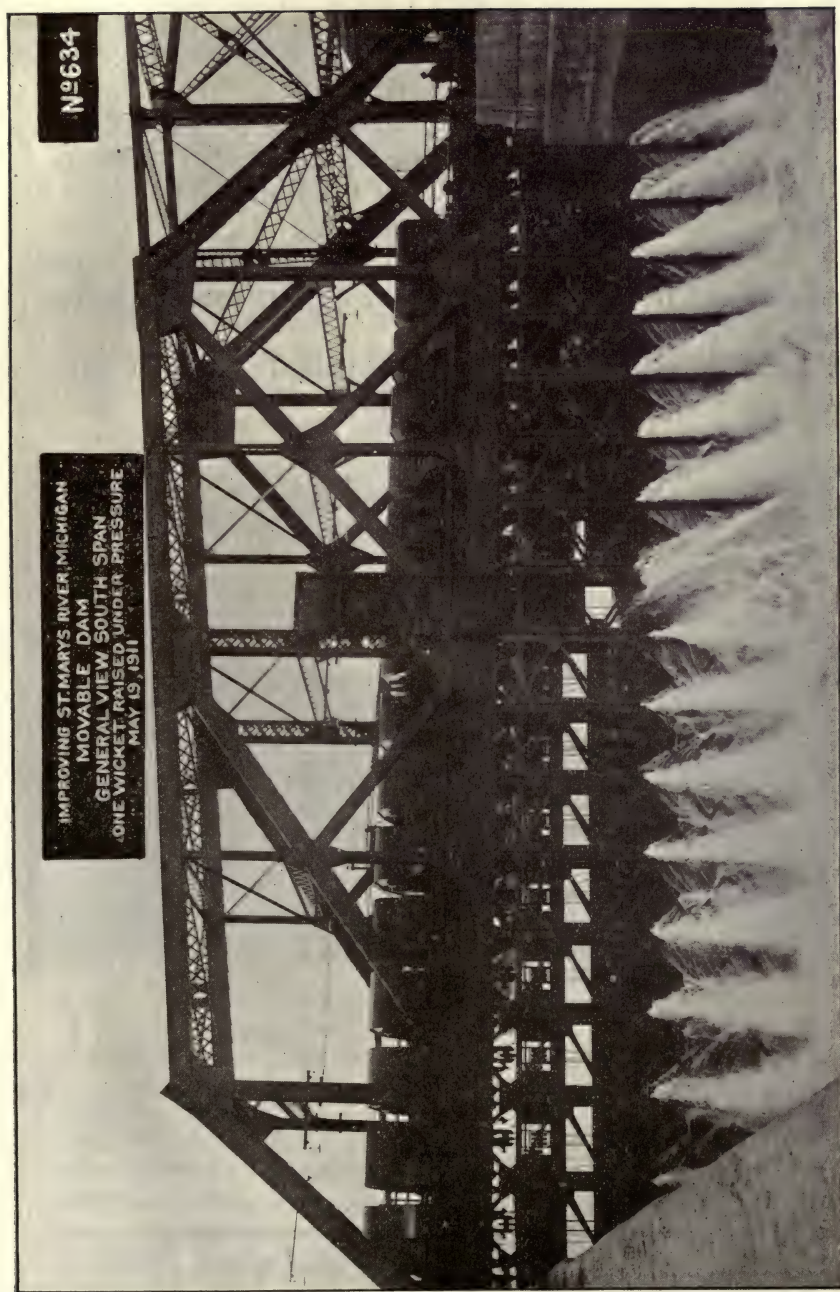


Steamer « Northland » in the Lock, Sault-Ste-Marie.

During the 57 years since the opening of the first American canal here, the yearly traffic has increased from 14,503 tons in 1855 to a maximum of 62,363,218 tons in 1910, and the increase in tonnage of each year's traffic over that of the preceding year has averaged about 20 %.

From Sault Ste Marie to Gary.

At Sault Ste. Marie the party on board the "Northland" had been reduced not only by the large number taking the Canadian trip, but also by the fact that about 15 members here left the "North-



St. Marys Falls Canal, Michigan. — Movable Dam. General view, south span. One wicket raised under pressure.

land" to proceed independently to the west by rail. The "Northland," now having on board only about 60 members, left Sault Ste Marie, Michigan, for Milwaukee, Wisconsin, at 4 p. m., the distance being 365 miles. The route lay through the St. Marys River, the north-western portion of Lake Huron, the Strait of Mackinaw and about two-thirds the length of Lake Michigan.

The weather during the night having been particularly favorable, good speed had been made, and Milwaukee was reached on the following day June 13 at 1.30 or one and a half hours before the scheduled time.

On arrival at Milwaukee the party was guided by Major Charles S. Bromwell, Corps of Engineers, U. S. A.



Business centre of Milwaukee.

After being duly welcomed by the Local Reception Commission of Milwaukee the party embarked on board the steamer "Manitowoc" for an inspection of the breakwater sheltering the outer harbor and of dredges at work in the harbor. Returning to the wharf, automobiles were found in waiting and the party was taken to Whitefish Bay, a summer resort on Lake Michigan, located several miles from the city, to be for a short time the guests of the Pabst Brewing Co. who offered them a hot "Bratwurst und

Bier" lunch. On the return to Milwaukee a stop was made at the Municipal Pumping Station for the water supply of the city. Both on the outward and return trips the party had an excellent view of the city's extensive park facilities. Passing through some of the best residential sections of Milwaukee, they arrived at the Deutscher Club, where refreshments were served and the party very agreeably entertained. Afterwards visits were made to the Public Library, to the new viaduct under construction, and to the Press Club, and then they were taken by automobiles to the Palm Garden of the Schlitz Hotel, belonging to the Schlitz Brewing Co., where an excellent dinner and entertainment (designated as "Bier-Abend") was tendered them by the company.

The room in which this dinner was held and everything connected with it and its surroundings furnished an excellent indication of the strongly German character of Milwaukee and particularly appealed to the German members. Towards the middle of the repast, Secretary William George Bruce, of the Merchants & Manufacturers Association, introduced Mayor Gerhard A. Bading, who presided as toastmaster.

Mr. **Bading** welcomed the guests in three languages — English, German and Spanish. In English he said :

"I rejoice from the heart to welcome so distinguished guests within the walls of our city. I am doubly rejoiced that foreign nations, through such representatives as we greet here this evening, have given the city of Milwaukee the honor of a visit.

We are proud of our city and her industrial progress.

Milwaukee now ranks third in regard to the valuation of all classes of freight received and shipped, the record of 1911 reaching practically 8,000,000 tons with a valuation of about \$120,000,000. Milwaukee also stands third in regard to the number of arrivals and departures from her harbor and also as to the total registered tonnage represented by the various craft. The combined arrivals and departures numbered over 11,000 during 1911. The growing importance of Milwaukee as a lake freight distributing centre is further emphasized by the figures which give the combined tonnage, both lake and rail, in and out of Milwaukee. The aggregate was 134,393,234 tons, or an increase of 90 per cent in ten years. Projected inner harbor improvements, when completed, will make Milwaukee harbor the second most commodious on the lakes. Seventeen steamers including several great modern car—ferries ply daily across the lake, winter and summer,

carrying an immense amount of grain and miscellaneous freight. Six steamboat lines, represented by 48 freight steamers, have terminals in Milwaukee harbor, and during the season of navigation transport grain and freight in connection with great trunk lines of railway to the seaboard. In addition to these across-the-lake and lower lake lines two lines operate boats along the west shore of Lake Michigan from Milwaukee to Chicago and also to ports north as far as Green Bay. Milwaukee is the greatest coal distributing point on Lake Michigan. Last year over 5,000,000 tons of coal were received here, practically all of which came by lake. A large quantity of grain is also shipped out of Milwaukee annually. Last year's receipts of all kinds of grain at Milwaukee approximated 48,000,000 bushels. Barley and rye have become two great features of Milwaukee's grain market; in fact, Milwaukee now has the credit of being the greatest primary rye market in the country. Besides the coal, grain, lumber, etc., the volume of package freight handled by lake liners is increasing rapidly every year. This class of freight demands warehouse room and facilities for economic transshipment. The port that gives the best service in this respect will become the greatest distributing point.

Continuing his remarks in German, Mayor Bading, expressed himself as follows :

I am really delighted to find such a large number of Germans amongst our guests this evening, and I am doubly delighted as Mayor of this place, to be able to welcome you in your mother tongue. Our city is known as the "German Athens", because German culture has given it the right to this title, and because this city reminds us proudly of our habits, customs, and language. I regret exceedingly that you are unable to prolong your stay amongst us, but I trust that when you cross the seas next time you will not forget to revisit Milwaukee. (*Applause.*)

Addressing himself then in Spanish to the Spanish members of the Congress, the Mayor spoke as follows :

Gentlemen, I am gratified in being privileged to welcome you on your arrival at Milwaukee, and I trust you will always preserve the most favorable recollections of our city. (*Applause.*)

After Mr. Bading, the Rev Joseph **Crimmelsmann**, President of the "Marquette University" at Milwaukee, congratulated the visitors in French, and reminded them of the great Frenchmen Lassalle and Père Marquette, who were the first to explore these regions, and whose names are so celebrated.

Mr. Emil von **Schleinitz**, Editor of the "Germania", one of the most important papers in the United States, was the next speaker. The following is a translation of his German speech.

Gentlemen,

When our esteemed Mayor asked me to-day at our meeting of the Reception Committee to address you in French, probably as a recompense for the campaign I conducted on his behalf last spring, and for voting for him in three different districts on election day, I was reminded of a story concerning the visit of the mother of the present German Emperor to the town of Posen. She was, as we know, an English Princess, and she was welcomed on her arrival at Posen by a Committee of young ladies, one of whom, just emerged no doubt from a girls' school in Geneva, was requested to speak, and made her remarks in French. But immediately on hearing her first mistakes in grammar Herr Royal Highness interrupted the speaker and said, — "Ladies, I pray you no French. I am the German Empress. Speak to me, therefore, in English." I reminded our worthy toast-master of this story, and he thereupon asked me to address you in German.

Ladies and Gentlemen, I am glad to be able to express to you all the joy I feel that you have not forgotten to stop in the most German city of the union during your travels in this country, where all eventualities are possible. I trust that you will take away with you nothing but cordial and agreeable recollections, but as a German born I cannot help expressing another wish. Some of you will no doubt, on your return to your own country, wish to write your impressions of America. Well, I think, as German-Americans we are entitled to be shown a little more leniency — one might almost say less disdain — than has been recently shown to us by the German poet Mr. von Wohlerzogen.

Ladies and Gentlemen, if German-Americans have really only been of use in this country "as intellectual manure" (Kulturdünger,) we can at least point with pride to the excellent fruits which this German manure has produced in all the spheres of human activity wherever it has been spread. Unfortunately we can only keep you with us for a few hours, but I think that this time will suffice to prove to you that our city is essentially a monument of German activity, and of the spirit of German enterprise; that is to say that it owes its commercial and industrial prosperity to the same causes which have made our own Fatherland so great and so flourishing. At the head of our Municipal administration we have a worthy representative of our second German generation, a German-American in the true sense of the word. We have hundreds of German societies here who sing German songs, and who adopt the habits and customs of the old country. At a choral festival last summer over 4,000 voices sang the national hymn of Germany in this very hall. If you look in our directory you will find a multitude of Mullers, Meyers, and Schmidts. We have

a German Church and Museums which are worthy to rank with the very best in the old country. And we publish a German paper here which, if I may say so without boasting, tries to be worthy of the haughty Statue of Germania which shelters and protects it with its shield. Once you are back again amongst your penates with our best wishes, you will be able to say that a German nation exists here which knows how to combine an unswerving loyalty to its new Fatherland with a faithful devotion to its old Fatherland. (*Loud applause.*)

And let me remind you once more, in conclusion, that it was a German citizen of Milwaukee who wrote that charming song in which the desire of the German-American to see his Fatherland once more is expressed so pathetically. (Mr. von Schleinitz concluded by reciting the German verses to which he had alluded.)

Mr. **Van der Sleyden**, delegate of the Netherlands, replied on behalf of the Permanent International Association of Navigation Congresses. He expressed himself as follows, in English :

Ladies and Gentlemen,

I am sure you will agree with me that in the few hours we stay in Milwaukee we have seen very interesting things. Immediately after our arrival we made a trip in the harbor and we were as happy to have the opportunity to visit the construction of the breakwater under the friendly and expert guidance of Major Bromwell, who is the clever superintendant of these works. We got a positive impression of the favorable situation of this city in connection to the lake.

Next we have been carried by automobiles through and round the city and were able to admire many avenues bordered by very fine buildings; I pay my respect to the architects, who made the plans of a great deal of these buildings, that have so very nice aspects.

And tonight under leading of the honored Mayor of this city we enjoy of an entertainment at the request of the Schlitz Brewing Company.

I bring my thanks to the Mayor, to Mr. Bromwell, to the Committee of Reception and to all persons who have so cordially contributed to prepare us so kind a reception and I offer my best wishes for the welfare of the city of Milwaukee. (*Loud applause.*)

Mr. **Bubendey**, delegate of Germany, spoke in his turn on behalf of his countrymen. The following is a translation of his remarks:

Ladies and Gentlemen, our trip on the great Lakes of the United States started right away with our admiration for that grandiose natural sight, the Falls of Niagara! During our journey in the gorges of Niagara we have

been able to see the gradual encroachment on the cliffs and the traces which hundred and thousands of years have left. Thousands of years ago the banks of the Niagara were covered with dense forests in which no man had probably ever penetrated, and it was only the Indians who for many centuries crossed these forests by paths which had been made by the hunter and the warrior. It is hardly 200 years ago that the first white men discovered these regions and founded colonies. The great conquests in the sphere of industry and commerce which we have been privileged to witness during the last few days all belong to the latter half of the nineteenth century, and the development of the beautiful city of Milwaukee which we have visited to-day under the friendly auspices of its inhabitants, and where we have been welcomed so hospitably, is only a few decades old.

The Falls of Niagara will continue, if all its waters are not tapped by steel mains to be transformed into motive power, to mark along its cliffs the passage of centuries and of thousands of years. What transformations will these great Lakes undergo during the course of these centuries! We know not, for the future is hidden from us, and we do not even know whether in the distant future man will still have coal and iron ore at his disposal. *Perhaps even, the man of that period will have no beer to drink. (*Laughter.*)

But what we do know — and we have made sure of this — is that the energetic population in this country, which will probably increase considerably in number, will achieve the highest ideals and objects that the conditions of nature enable us to forecast.

Ladies and Gentlemen of Milwaukee, we express the best wishes for the successful solution of the great problems which await you. We thank you with all our hearts for your cordial reception, and we wish that all your efforts for the future may be crowned with the utmost success. I raise my glass to the city of Milwaukee, to its Municipality, to its citizens, and to their ever increasing prosperity. (*Loud applause.*)

Mr. **Brockmann**, delegate of Spain, then thanked the local Committee of Milwaukee on behalf of the Spanish members of the Congress, for the fine reception which had been reserved for them.

Mr. **de Hoerschelmann**, delegate of Russia, then made the following speech (in French) :

Ladies and Gentlemen,

We have not had time to acquaint ourselves in detail with all the wealth and beauty of the city of Milwaukee. That would require too long. But the few hours of our stay here have convinced us that the City of Milwaukee is not only an industrial and commercial city in the strict sense of the

term, but is also actively assisting in the development of navigation, and that it interests itself in the sciences and arts, as we see from its important educational Institute, its libraries, its extraordinarily large auditorium, its magnificent Museum of Fine Arts, its numerous Choral and Musical Societies, etc.

And for us, Russian members of the Congress, there is the freshness of the air which, although it may not be to the taste of everybody, is like a salute from our own Fatherland with which the hospitable city of Milwaukee acclaims us.

I raise my glass in honor and to the prosperity of this hard-working city, which is at the same time so charming and so artistic.

Long live the city of Milwaukee. (*Loud applause.*)

The last speaker of the evening was Captain Matsumura, of the Japanese Navy, who expressed his sincere thanks for the enjoyable entertainment at Milwaukee.

During the dinner national airs and other instrumental music were played.

About 11 P.M. automobiles were taken for the wharf of the "Northland", the Milwaukee Commission accompanying the party to the wharf. The steamer left at midnight for Gary (102 miles distant), the members regretting that their stay in this hospitable city had been far too short.

Gary to Chicago Trip.

The "Northland" arrived at Gary early on June 14 and lay at the wharf whilst the members breakfasted.

After breakfast the representatives of the Illinois Steel Co. came on board to welcome the members and to offer them the hospitality of the Company.

At the same time a special train, composed partly of open and partly of closed cars, was switched down to the wharf, alongside the steamer, the members boarded the train, and visited the entire plant of the Co. which interested them greatly.

At 1 P.M. the steamer left Gary for Chicago, a distance of 34 miles. Members of the Chicago Reception Commission, consisting of officials of the city of Chicago, members of the Western Society of Engineers, the Association of Commerce, Lincoln Park Commissioners and the Rivers & Lakes Commission of Illinois, had joined the party at Gary.



Unloading ore from Lake vessel at Gary, Indiana.

Arriving at Chicago at 4 P.M., conveyances awaited them at the wharf and took them to the hotel Sherman, at which quarters had been engaged. The ladies had the agreeable surprise of finding their rooms supplied with flowers. An information bureau had been established at the hotel by the Western Society of Engineers, and was in charge of interpreters who were prepared to answer all inquiries that might be made by the members, during their stay in Chicago.

Banquet at the Congress Hotel.

This banquet, offered to the gentlemen of the party by the Chicago Association of Commerce, the Western Society of Engineers, and the Local Members of the 12th Congress, took place in the Gold Room of the Congress Hotel which faced the Lake. The room had been handsomely decorated for the occasion. After

an excellent dinner, Mr. **W. C. Armstrong**, President of the Western Society of Engineers, welcomed the members as follows:

Gentlemen,

We are particularly fortunate this evening in having an opportunity of showing our interest in, and our good feeling toward such a distinguished body of representatives from the honored nations of the earth. It is always a pleasure to do honor to those who have been instruments in the accomplishment of the things which make for the advancement of mankind, and none are more deserving of this honour than the engineer in the various activities which engage him.

Gentlemen, we are glad to have you with us. We are proud of the privilege of presenting to you some of the things which have been accomplished in this young city of the West. Chicago has not the history of centuries recorded in her works of the arts and sciences, like many of the cities of your native lands; but she is writing the history of today in works that will leave their impress upon the centuries to come. (*Applause.*)

The spirit of Chicago is known the world over. The restless energies of her people is an example which the entire western world is striving to emulate. The very air we breathe is charged with an elixir that quickens human activity and begets a hustle. I doubt not that even in your brief sojourn among us you will become inoculated with that spirit, for it is surely infectious. (*Laughter.*)

But it is not my purpose to dwell longer upon the glories of Chicago, nor upon any theme in particular. That will be left to others more capable of interesting and entertaining you. My duty and my pleasure is simply to offer you our greeting. Representing the Western Society of Engineers, and, co-operating with them, the Chicago Association of Commerce and various bodies organized for and devoted to the public welfare, — in behalf of these and of our city with her two and one-half million people, I bid you welcome. (*Loud applause.*)

The speaker was followed by Mr. **Leon Hornstein**, Assistant Corporation Counsel of the City of Chicago who welcomed the members on behalf of the Mayor of Chicago, Mr. **C. H. Harrison** whom he represented.

Mr. Toastmaster and Gentlemen,

I appear here to-night as a substitute for the Mayor of Chicago to bring his greeting and express his welcome to the distinguished Marine Engineers who honor us by their presence. A substitute is necessarily a disappointment, and at his best he can but rattle around in the place that the genuine



The Lake Front, Chicago, Ill.

Photograph by Kaufmann, Welmer & Fabry Co.

personage would fill. Since you belong to a profession, however, that makes a business of overcoming obstacles, you may regard me as one of the unforeseen perils of navigation — but one which does not constitute much of an obstruction and will be easily overcome. (*Laughter.*)

The first message which the Mayor wanted me to deliver to you is the regret that he feels at being unable to attend. As I look about me at this gathering, not forgetting the reminders of the sumptuous repast of which we have partaken, and reflect on the delightful conversation that I have enjoyed with my neighbours on the right and on the left — a conversation which did not lag on account of my halting German, for their better knowledge of English came to the rescue—I can realize how keen must have been the Mayor's disappointment at his inability to attend. But what is his loss is my gain. So I am to-night doubly honored. The Mayor has honored me in delegating to me the discharge of this very pleasant duty at this festive board, and I am even more honored in having the privilege of participating in this splendid function.

Since many of you come from parts of the world where only a portion of Chicago's reputation has penetrated, and some of you may know but little of its history or its greatness, it would perhaps not be amiss for me to call attention to a few things with which all Americans are familiar, but which may interest those of you who come from abroad.

If you will pass down this street about half a mile to where it begins, at the Chicago River, you will find a tablet indicating the site of Fort Dearborn, which was one of the outposts of civilization, designed to protect a few settlers in this neighbourhood from the Indians.

Going in the other direction about a mile, at the lake shore, you will find a monument erected to commemorate the massacre of the settlers and the brave defenders of the fort who were beset by savages and completely destroyed.

This happened less than one hundred years ago. Lest you should think from this that the town of Chicago existed at that time, I hasten to add that the real settlement of Chicago by those who laid the foundation of this city did not take place for a long time after that—possibly twenty years or more.

There was nothing but a wilderness here after the Fort Dearborn massacre until the early thirties. At that time a few families located at the mouth of the river and the settlement grew until on March 4, 1837, the town emerged from its swaddling clothes and became a full-fledged city with some 1200 or more inhabitants. The city to-day, seventy-five years after its incorporation, contains two and one-half millions. So you will see that in the span of the average lifetime, the swamps which were the abode of hostile indians became one of the great cities of the world.

Naturally we Chicagoans feel proud of this record. But we do not feel proud on account of Chicago's growth in population alone. We feel proud of its commercial supremacy, proud of the fact that it is one of the great workshops of the day, and proud of its advancement along economic, intellectual and artistic lines.

You can form some idea of Chicago's greatness from the palaces of trade that you can see in the heart of the city, but to know it fully you will have to go beyond the central districts. I have learned, since I came here this evening, that you intend to view in a body the great engineering feat accomplished by our people, who by means of the drainage canal are now sending the waters of Lake Michigan over the continental divide to the Mississippi River. I am glad that you will do this, not only because it will interest you as engineers, but because you will get a better idea of the greatness of Chicago.

I hope you will find time, before you go away, to see some other things which will show the marvellous development of our city. I hesitate to tell you of our artistic accomplishments, because most of you have travelled in the cities on the continent of Europe where the votaries of art have made their abode for centuries.

But if you don't think it worth while to visit our Art Institute, which is right near here, then at least take a look at our Stock Yards. We may not lead the world in pictures, but we do in pig-sticking (*laughter*) and if you will go to the Stock Yards you will find that there is real art in pig-sticking. (*Laughter.*)

But I will not further advise you in regard to the manner in which you should spend your time. I understand that you are in the hands of a committee that is looking after that. My purpose in speaking to you is to bear the greeting of the Mayor of the City of Chicago, to tell you on his behalf that he and all other citizens of Chicago rejoice in the opportunity of extending some small degree of hospitality to men of world-wide reputation whose visit to this city must add to human advancement and human greatness. For you are the men who do things, who observe, think and act; and the mere fact that you come to Chicago will not only broaden your horizon, but, by what you take back with you, will tend to help Chicago abroad, and make it easier for Chicago to do its share in the work of the world. (*Applause.*) I am sorry the Mayor could not himself tell you this, but as the bearer of his message, I speak for his sincerity and good will and the good will of all our citizens when I say that Chicago extends to you a most heartfelt welcome. (*Loud applause.*)

Mr. **H. C. Cardner**, representing the Chicago Association of Commerce followed Mr. Hornstein and congratulated the members of the Congress.

On behalf of the Chicago Association of Commerce and as Chairman of its Committee on Waterways, it gives me great pleasure to extend a most hearty welcome to our guests of the evening. Your organization we recognize as a most beneficent one. Your field of activity is such that representatives of the different nations have a common interest and a

common aim. Many international organizations have not this advantage, but have to do with matters in which the interests of their countries diverge somewhat. In matters of navigation the interests of all nations are alike. What is good for one is good for all. We classify your organization with the International Red Cross and the World's Peace Movement.

It may not be amiss for me to tell you something of the organization in whose behalf I extend this welcome, the Chicago Association of Commerce. Our organization, as you will infer from its name, is primarily a commercial one, but we do not confine our membership to men and business houses engaged in commerce; we include as well manufacturers. We also include those engaged in the professions, engineering, law and education. For instance, we are proud to number among our members Captain Hunt, Mr. Bion Arnold and Mr. Modjeski. The lamented Daniel H. Burnham was one of our most esteemed members. President Judson of the University of Chicago and President Harris of our equally great Northwestern University are both members. Dr. F. W. Gunsaulus and Rabbi Hirsch we are proud to number among our membership. Chicago's first citizen, Jane Addams, is a life member. The purpose of thus including among our membership the commercial, manufacturing, professional and philanthropic leaders of our city is not by any means mere increase in numbers. I assure you we recognize the fundamental difference between true greatness and mere bigness. Our true purpose is to bring together in a single organization those whose tendency is to look upon public matters solely with reference to their business relations and the growth of our business interests, those who see only through the artist's eye and would have our city made beautiful, and those whose business it is to educate and to upbuild humanity. By this bringing together and by a common discussion among these varied elements we seek to, and we believe we do, crystallize the sentiment of our community and help generally toward the advancement of Chicago in a sane and sensible way, combining in proper proportions the material and the ideal. Within a few days a prominent philanthropist of this city has publicly protested that the tendency of our people is too much toward the creation of a "city beautiful", and the neglect of what he is pleased to term the "city dutiful". Our organization not only seeks to promote the growth of the "city beautiful" and the "city dutiful", but what I will term the "city bountiful". We would have the Chicago of the future an ideal place in which to live, at the same time not forgetting that it must be an ideal place in which to get a living.

You have doubtless read and heard much of the phenomenal growth of Chicago, and the thought that this is due to its position at the head of Lake Michigan is not new to you. It seems perfectly apparent to all students of our short history that this advantageous position with respect to water navigation had, to say the least, a great deal to do with our rapid early growth. Later we came into a period of railroad building and the

development of transportation by rail. Here again our position at the southerly end of the Great Lake compelled the railway lines to converge, and we thus became the greatest railway centre on the face of the globe. We have now entered upon a period of reconsideration of our transportation problem and many of our best thinkers believe, and it is my personal belief, that Chicago has not by any means reaped the full destiny. The future, we believe, is to bring us greater and greater activity and growth because of this position with reference to our Great Lakes System. We believe the time is near when navigation through the St. Lawrence and up the Great Lakes will be so improved that we will be linked much more closely with the transatlantic countries. We expect also within the next decade to accomplish such improvements of our canal and waterway system between Chicago and the Gulf of Mexico that our commerce can flow freely and uninterruptedly to the southward. We believe as students of navigation a study of our situation and the possibilities of these great waterways and our Great Lakes System will lead our guests of the evening to a like conclusion. We seek to promote these ends and we ask our visiting friends to study the situation, believing they will see in prospect the future as we see it. (*Loud applause*).

In conclusion, I repeat my words of welcome. We hope you will enjoy your visit with us. We hope you will come again and come often. You are welcome. You will always be welcome. (*Loud applause*).

Mr. Onward Bates, Past President of the Western Society of Engineers, followed with a few brief remarks.

He spoke of the respect entertained by engineers for their colleagues of every land and of the pleasure it gave the members of the Western Society of Engineers to meet such a body of distinguished engineers from the different parts of the world. On behalf of the Society he cordially welcomed them to Chicago and wished them a most interesting and agreeable visit.

Responses were made by the following foreign members :

Mr. **Henry Engelbach**, of France;

Mr. **Wilhelm Germelmann**, of Germany;

Mr. **I. Hiraga**, of Japan;

Mr. **C. A. Jolles**, of the Netherlands;

Mr. **Emil de Hoerschelmann**, of Russia;

We give below the translations of the German speech of Mr. **Germelmann**, and of the French speech of Mr. **de Hoerschelmann**,

The first named expressed himself as follows :

Mr. Toastmaster and Gentlemen,

I comply most willingly with the request of our Toast-Master, to express on behalf of the German members of the Cōngress our most grateful thanks to the citizens of Chicago, to the local Reception Committee and to the representatives of commerce and industry of this district for the magnificent and cordial welcome with which they have received us in their fine city, which happens to be at this moment in the throes of a political crisis.

In view of the political conditions which absorb your attention at this moment and the comparatively small number of members of the Congress here present, we feel all the more honored by your welcome. You have given us the opportunity of admiring your important works connected with industry and navigation, which have given a world-wide reputation to Chicago and its environs. We have been very much spoilt during our journey across America, but it seems as if the further we go west the more does Nature and its treasures show themselves on a larger scale, and the more do the inhabitants of this favoured land exhibit increased energy.

Here, as we have just been told, one does not think of moderate sized canals for the requirements of navigation. Oh no! Chicago wants to be connected with the Gulf of Mexico by a navigable waterway which can be used by the very largest ships. The length of the American coast line will be doubled. Well Gentlemen, as a German rendering homage to the device "Navigare necesse", I can only wish you success in your projects, and trust that they may be an accomplished fact as soon as possible and with the greatest perfection possible. I am convinced that this will only promote still further the prosperity of Chicago and of the whole of America, and that you will therefore accomplish a work of peace of the greatest importance.

For, Gentlemen, the blue riband of navigable waterways does not separate peoples from one another, but connects and brings them together, on the contrary, and establishes commercial and intellectual relations which forge indestructible chains for the goodwill and concord of the whole of humanity.

I invite my compatriots to raise their glasses to the development and the grandeur of the fine city of Chicago, and also to the prosperity of its charming inhabitants; and I ask them also to shout with me three times, "Chicago, Hoch! Hoch! Hoch!"

Mr. **de Hoerschelmann** expressed himself as follows :

Mr. Toastmaster and Gentlemen,

For Engineers whose object and work in life has been the development and improvement of navigable waterways, as is the case with most of us here at present, it is a special opportunity and quite a privilege to be at

Chicago. Not only is this city situated on the celebrated navigable waterway of the great lakes of America where inland navigation is very similar to maritime navigation in many respects, but we must not forget that, twenty years ago, when our Permanent International Association of Navigation Congresses was about to be constituted, the city of Chicago organized a brilliant Congress of waterways, of which several members of the Permanent Association still retain an agreeable recollection.

And now the city of Chicago possesses a canal which, although it is called a drainage canal, will be a great navigable waterway with a volume of water equivalent to many rivers which are naturally navigable.

I raise my glass to the prosperity of Chicago as an incomparably important city for Inland Navigation. Long live the city of Chicago! (*Loud applause*).

Mr. **James B. Bonner**, of Philadelphia, at the request of the Toastmaster, then spoke briefly on behalf of the Organizing Commissions, complimenting Chicago for its hospitality, for the manner in which the members of the party had been received, and for the excellent program prepared. He expressed regret that the Congress and its excursions had come to a close, and added :

‘Everyone of us has enjoyed the society of the members of this Association, and I can say that in all my experience I have never found so kind and considerate and appreciative ladies and gentlemen as those who attended the Congress. We hope that if we are not so fortunate as to have another meeting of the Association again in this country within a reasonable time, we shall at least have the pleasure of soon again seeing these members individually.’

This speech was loudly applauded and the banquet broke up amidst great cordiality.

Dinner and Theatre Party for the lady members.

At about the hour of the banquet to the gentlemen at the Congress Hotel, the ladies of the party were tendered a dinner in the Rose Room of the Hotel Sherman by the Chicago Women’s Club, which was represented at the dinner by Mrs. E. H. Haines, Mrs. John O’Connor, Mrs. John Worthy, Mrs. Le Roy Goddard and Miss Grace Temple. After dinner they were taken in automobiles to attend the performance of “A Midsummer Night’s

Dream" by the Ben Greet players at the Auditorium Theatre, where private boxes had been reserved for them. The performance was a very good one and was greatly enjoyed.

In the morning of June 15, most of the members in Chicago were taken through the very extensive park system of Chicago. They were afforded an opportunity of seeing the grounds and buildings of the Chicago University as well as a view of the few remaining structures of the World's Fair Exposition, which was held in Jackson Park in 1893. Other members who preferred were taken to the Union Stock Yards and shown through the immense establishment of Swift & Co. Automobiles were provided by the Local Commission for both of these trips.

At noon, upon their return, the ladies were entertained at luncheon by the Chicago Women's Club, in their rooms in the Fine Arts Building, the President, Mrs. George Bass, presiding.

Visit to Chicago Sanitary and Ship Canal.

The programme for the afternoon called for an inspection trip of the Chicago Sanitary and Ship Canal. For this purpose a special train was chartered on the Santa Fe Railway which left



Chicago Drainage Canal, Tumbling Basin, Chicago, Ill.

the Polk Street Station at 1.15. At Romeo, Illinois, the guests were transferred to barges furnished by courtesy of the Lincoln Park Commissioners and the excursion continued by water down the canal. The first stop was made at the Bear Trap and Butterfly Dams, which were operated for the benefit of the visitors, and they then proceeded down the canal to Lockport, two miles distant, where the locks are located, and these were also operated for the visitors. Here the delegates had the opportunity of inspecting the hydro-electric generating station of the Sanitary District of Chicago, which supplies the lighting for the boulevard system of Chicago and other purposes. The return trip was then made to Chicago, arriving about 6 P.M.

This completed the official trip arranged by the General Organizing Commission and also the official tour of the members of the XIIth Navigation Congress through the United States. Many members continued their visits in groups to many interesting points in the Mississippi Valley and in the far west, after prolonging their stay at Chicago, during which they continued to receive the care and attention of the local commission. All the party had been much impressed with the cordiality and hospitality of the Chicago people. Those who had had the Great Lakes trip in charge felt especially thankful to this Commission for their efforts in bringing this trip to a successful and delightful close.

Canadian Excursion.

About 130 Members of the Congress took part in this excursion, which was organised under the auspices of the Canadian Government with the help of the Canadian Society of Civil Engineers. They parted from their travelling companions at Sault-Ste Marie on the 12th June, and left American territory to pass over to the Canadian side where they embarked on the steamer "Assiniboia" of the Canadian Pacific Railway.

The "Assiniboia" left at 3 in the afternoon and descended the river Sault-Ste Marie, crossing the upper part of Lake Huron and the Georgian Bay, to arrive on the following morning at Port McNicol. Several hours were devoted in that place to inspect the new and extensive terminal facilities of the Canadian Pacific Railway.



Waterfront of Toronto.

About noon, the party left by special train for Toronto, arriving at the North Parkdale Station at 1.15 p. m. On arrival they were welcomed by the Committee of the Toronto Branch of the Canadian Society of Civil Engineers, and were taken in special street cars to the King Edward Hotel, where they were to be quar-



Hon. JOHN DOUGLASS HAZEN
Minister of Marine and Fisheries of Canada

TO THE
MEMBERS OF THE
LEGISLATIVE ASSEMBLY

tered during their stay in Toronto. Here an informal luncheon was served, during which national airs were played.

In the afternoon, through the courtesy of the Toronto Board of Harbor Commissioners and the Commodore and Members of the Royal Canadian Yacht Club, the party were taken on a trip around Toronto Island on the handsome steam yacht belonging to Mr. J. C. Eaton and on several sailing yachts belonging to members of the Club. The party landed at the house of the Yacht Club, where they were received by the members of the Club and their ladies on the lawn.

A dinner was given in their honor at 7 o'clock, which was very animated and accompanied by numerous speeches.

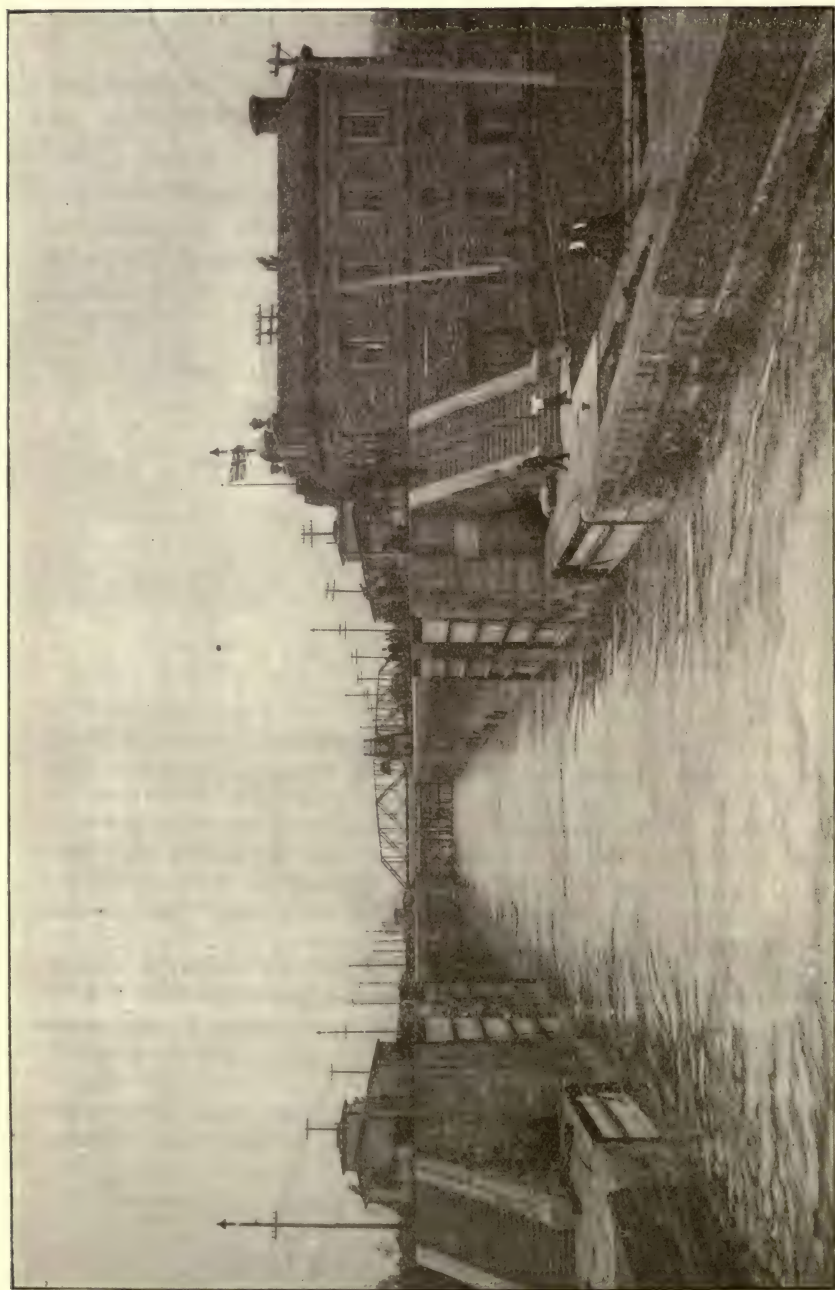
We reproduce below the speeches of Messrs. H. C. Hocker, Mayor of Toronto, and G. T. Somers, President of the Toronto Board of Trade.

Mr. H. C. Hocker said (in English) :

Ladies and gentlemen,

It is indeed a pleasure to me to welcome you this evening in behalf of the City of Toronto. As delegates to the International Congress of Navigation, you come from various sections of the world,—many of you from countries where your harbors are your boast and your pride. In this respect, I am sorry to say, we have very little to show you. We have, however, recently appointed a Harbor Commission, in whom we have a great deal of faith, and to whom we have entrusted the problem of improving our harbor and waterfront. We freely admit that while nature has endowed us with a harbor which, in point of natural facilities, lends itself to great possibilities, we have done little or nothing to aid her bountiful handiwork. We promise you, however, that if you will return to our City in the course of a few years you will see in progress such improvements as will, when completed, make our harbor second to none on the continent of America.

We are glad to know that the Queen City of Canada, as we are pleased to term it, has been chosen as one of the stopping off places of your Convention. We believe that we have a reputation for hospitality, and we hope that that reputation will be so confirmed by your experience during the next few days that we may at some future date be again honored with your presence.



Canadian Lock, Sault-Sainte-Marie, Ontario,

Mr. C. T. Somers, President of the Toronto Board of Trade said (in English) :

Mr. Chairman, ladies and gentlemen,

Such remarks as I may make on this interesting and happy occasion will be mainly formal, for I am speaking on behalf of the Toronto Board of Trade, a body of over 2,500 business men keenly interested in the future of this great City and this country. In their name I desire to extend to the Internaional Congress of Navigation, and particularly to the ladies, a warm and hearty welcome.

We are fully aware of the distinction conferred upon us by your visit and we are hopeful that your all too brief tour will serve to bring to your attention some of the Industrial possibilities of this great new country. I am not likely to overlook the fact that many of you already have become convinced of the fertile field for capital investment which Canada provides with its enormous undeveloped wealth of forests, minerals, agriculture, fisheries, etc. Not long ago the Toronto Board of Trade had a report prepared on the resources of the northern part of the Province of Ontario, only one small corner of this great Dominion. In that district the estimated amount of available pulp wood exceeds 300,000,000 acres. Further, the National Transcontinental Railway crosses nine great rivers of a total length of 1,800 miles which tap the pulp wood areas. It is perfectly feasible to erect pulp mills near the Railways and have the problems of supply and marketing immediately solved. Waterpower is plentiful all through the northern region. About Twelve million horse power is available for profitable Hydro Electric development. Mr. Roderick J. Parke declared that on the basis of an average investment of \$96 per horse power, Canada offers a field for the profitable and sound investment of \$960,000,000 of capital.

May I say that in my opinion no other country in the world has such wealth of present and potential resources.

I need not weary you by dwelling on the numerous other resources referred to in said report, nor in giving you details as to the rapid and substantial growth of the City of Toronto, with its population now nearing the half million mark, and with a firm conviction that inside of the next twelve years this City will have a population of a million English speaking people. Toronto is commonly known as a "City of Homes", where citizens own and occupy their own dwellings, and if you can spare the time to drive through some of our residential districts, I am satisfied you will carry away with you a very good impression of the same.

Ladies and members of the International Congress of Navigation, on behalf of the Toronto Board of Trade, I welcome you, and only wish we could let you see with your own eyes some of our country and particularly that hinterland of which I have already spoken.

We trust that you will have a pleasant time during your visit, and that we may soon see some of you again not only in a touring but in a professional capacity.

All returned very late in the evening to Toronto.

On the 14th June the members of the Congress devoted their morning to promenading the city, during which they visited the most interesting quarters and stopped at the provincial Parliament Building and the University of Toronto. They subsequently lunched at the restaurant Mc. Conkey as the guests of the City Council. Several speeches were made at the end of the repast, amongst others being that of Mr. **C. R. Ceary**, Counsel to the Corporation, who spoke in English as follows :

It is a great pleasure and a distinguished honor to entertain so representative a body of men; and we trust that their investigations will lead them to appreciate—as we always have appreciated—the importance and potentialities of the great waterways of this continent. The City of Toronto must needs take a great interest in navigation; for, not only have her citizens been boatmen and sailors from their earliest days, but they are very appreciative of the advantages which must directly accrue to the City's material welfare from any advance made in the science of navigation, or any progress or development in water-borne transportation. The City of Toronto is proud to have within its borders and as its guests to-day gentlemen representing so many of the nations of the world. In this great new country, they will find many of their compatriots, and will find them, I hope, contented and happy with their new lot and ready to say that the Dominion of Canada has given them a warm welcome. I do most heartily extend the welcome of the Corporation of the City of Toronto to our guests of to-day. not only because of the great interests that have been committed to their care, but also because our happy experience has been to find them gentlemen whom to meet and know has been an opportunity gladly taken advantage of by those fortunate enough to have had that pleasure. We trust they will return to their homes with happy memories of Toronto, and they may be satisfied that they leave behind them in our hearts and minds most pleasant recollections of their all too short visit.

Mr. **Luiggi**, Delegate from Italy, then spoke in English as follows :

Mr. Chairman, Ladies and Gentlemen!

To your beautiful country—Canada—the land of the sweet maple trees, of the beautiful orchards, of the immense wheatfields, I bring the heartiest good wishes of my country—Italy—the land of arts, of music, of sunshine, where the orange is always in bloom!



GROUP OF CONGRESSISTS AT THE ROYAL CANADIAN YACHT CLUB, AT TORONTO

California
May 1919

In the name of my colleagues from Italy, I express to you our most sincere thanks for the courtesies bestowed upon us since we touched Canadian soil, and for the kind reception given us in this charming city of Toronto, which from the Lake gave us the vision bright and fair of our Venice! and your kindness and hospitality made us dream of being at home!

To you all, to the Canadian Society of Civil Engineers who have planned our visit to your beautiful land, I express the most heartfelt thanks of all our colleagues and the wish of an increasing prosperity of Canada for ever and ever! (*Loud applause.*)

At 2.30 P. M. the party left Toronto on the Steamer "Kingston", of the Richelieu and Ontario Navigation Co., for Prescott, on the St. Lawrence River, the route being through the greater part of the length of Lake Ontario and the upper part of the St. Lawrence River, passing the Thousand Islands.

The steamer first crossed Lake Ontario diagonally to Charlotte, N. Y., the port of Rochester. From Charlotte a direct course was taken to the head of the St. Lawrence River.

The steamer arrived at Prescott, Ontario, about 10 A. M., after passing through the Thousand Islands by daylight. Here the party was met by the Committee of the Ottawa Branch of the Canadian Society of Civil Engineers. From Prescott a special train carried them to Ottawa, where they arrived at noon and were magnificently received in the capital of the Great Dominion and escorted to the new magnificent Chateau Laurier hotel, which is connected with the railway station by a tunnel under the intervening street and where accommodation had been reserved for them.

During the afternoon it had been arranged that automobiles should convey the party, in a most interesting trip though Ottawa and the vicinity.

The itinerary first comprised a visit to the Parliament Buildings, including the Parliamentary Library, the Senate Chamber and the House of Commons, the corner stone of this building having been laid in 1860 by King Edward VIIth, who was at that time Prince of Wales.

The party then went to Rockcliffe Park, crossing through the Rideau Hall grounds, official residence of His Royal Highness

the Duke of Connaught, Governor General of Canada, and from thence went to the Dominion Government experimental farm and the Astronomical Observatory which is erected in the same grounds.

The party then went to the "Chaudiere Falls" on the Ottawa river and stopped to examine a water power dam controlling 50,000 H. P. and also a hydraulic power plant, electric stations, sawmills, pulp and paper mills.

The return trip took place through the city of Hull and over the interprovincial bridge which connects the provinces of Quebec and Ontario, and from the top of which one obtains a magnificent view of the Parliament Buildings, the Chaudiere Falls, and the lower Ottawa river.

During the outward trip the party also had the occasion of seeing the locks of the "Rideau Canal" which were built in 1832, overcoming the 80ft difference in levels between the Ottawa river and the Rideau Canal.

Banquet at the Chateau Laurier Hotel.

This banquet was tendered to the gentlemen of the party by the Government of Canada, and took place in the beautiful banquet-hall of the hotel, which had been decorated with remarkable taste.

The Hon. J. D. Hazen, Minister of Marine and Fisheries, member of the Permanent International Commission of Navigation Congresses, presided, having on each side, in addition to the principal delegates of the Congress, the Hon. Sir Wilfrid Laurier, former Premier, the Hon. G. H. Perley, acting premier, the Hon. F. D. Monk, Minister of Public Works, the Hon. C. J. Doherty, Minister of Justice, the Hon. L. P. Brodeur, former Minister. Numerous Members of Parliament and other notabilities of Ottawa were present at the banquet.

Several speeches were made at the end of the repast. After the toast of The King, which was warmly applauded, the Hon. **J. D. Hazen** proposed the health of the guests. In well chosen terms he welcomed them to his country.

Their experience in the maintenance and construction of navigable waterways would, he had no doubt, be of great use to Canada, as no other country in the world has such important navigation problems to solve. A meeting like the one this evening could not fail to contribute towards the consummation of the desire of them all; which is to see the day of universal peace. (*Applause.*) Mr. Hazen then expressed regret that the short space of time at the disposal of the members would not allow them to visit the eastern provinces, but in any case in their journey towards Quebec they would have the opportunity of seeing what had been done by Canada to convert Montreal into a great seaport, and they would also be in a position to appreciate the importance of the works of providing the St. Lawrence river with a suitable channel. Much had been done up to the present, he added, but it was nothing to what would follow.

The honorable Minister then invited the members on behalf of the Government and the Canadian people to hold a Congress soon in Ottawa, where he promised them the warmest welcome.

His closing remarks were much applauded.

The Hon. Sir **Wilfrid Laurier** seconded the toast.

He expressed regret at the bad weather, but praised the objects of the Association of Navigation Congresses. He thought there was a gap in its agenda which he hoped would soon be filled by the insertion of a clause relating to the suppression of sea-sickness. "I have tried the ocean", he said,—“I have tried the sea of politics, and if there are storms and squalls there I have no objection to take them as they come; but on the ocean the slightest squall takes from me all the manhood which I have.” (*Laughter.*)

Such a Congress as theirs, said Sir Wilfrid Laurier, showed that they were the promoters of civilisation and messengers of peace. It was the privilege of Canadians to have lived in a century of peace, and they were glad to see the growth of sincere friendship between the nations of the world. They were going to celebrate a hundred years of peace between Great Britain, Canada, and the United States, and he trusted that that celebration would be shared by all the civilisations of Europe. (*Applause.*) The Congress was not only a powerful instrument for the advancement of navigation, but it was one of the most potent instruments in the civilisation of the world. If they could not hold their next meeting in Ottawa he trusted they would hold their next following Congress there, and then they would see that it does not always rain in Ottawa, but that the sun does shine there sometimes. (*Laughter and applause.*)

Baron **von Coels von der Bruggen**, first delegate of Germany, was the first to reply to these two speeches, and expressed himself (in English) as follows :

Mr. President, Your Excellencies, Gentlemen,

The kind invitation of the Government of Canada to visit this country has been thankfully accepted by numerous delegates and members of the different nations represented at the International Navigation Congress. We have heard very much of the wonderful development of the Dominion of Canada during recent years. Many people of the whole world have come to this country hoping to find a new home and a new existence. It was our wish to visit the rapidly developing cities and we are grateful that this opportunity has been offered to us.

The rich gifts which nature has bestowed on Canada certainly account for the economical progress, but other reasons are of no less importance. I think that the country has a marvellous effect on the energy of the people. Every one is active and many who in old Europe thought that work was a heavy burden soon change their mind and become useful members of society. The emigrants from different nations who in Europe look upon each other as competitors, join their forces and very soon all become good and reliable citizens of their new country.

In tendering the most heartfelt thanks for the warm reception which has not been surpassed in any city we have visited, I wish that under the lead of the excellent men who govern this country, Canada may continue its way to prosperity and development. (*Loud applause.*)

Mr. **Chargueraud**, first delegate of France, then spoke in eloquent terms to thank the Canadian Government for the cordial reception which they had made to the members of the Congress. Mr. Chargueraud expressed himself as follows, (in French) :

Mr. President, Your Excellencies, Gentlemen,

It is not without a vivid and real emotion that I venture to speak here. I am surrounded by eminent and prominent men who hold in their hands the destinies of a great country, and this fact alone would justify my diffidence; but there is something else which increases it still further. Canada, Gentlemen, (I do not think I am the only Frenchman with these views) is a country which has always held a special place in my imagination. From my infancy Canada has appeared to me as the legendary country, where the hardy French explorers tried to emulate those bold navigators from Genoa, Florence, Spain, Portugal and the Netherlands, who were

classed by our infant minds amongst the heroes of the legends of antiquity. It was also the country of great adventures, the country of those magnificent path-finders, celebrated by Fenimore Cooper and Jules Verne; the country of those terrible tribes of Hurons and Iroquois Indians who excited our childish imaginations.

Subsequently I found that Canada was a country where, thanks to the political liberties of England, that great nation whose flag flies all over the world, French genius, French spirit and French taste had not only survived, but had flourished admirably. (*Applause.*)

The agricultural, industrial, commercial and financial development of Canada can only be compared to that of its powerful neighbour, of whose territory we have only percoursed a slight portion. But in order to exploit this vast domain it required a strong and energetic race, seconded by a powerful industrial and financial organization, which was at the same time both independent and prudent. Side by side with the Scotchmen, the Englishmen and the Irishmen, our Bretons, our Normans, and our Poitevins have come here with their characteristics, and this intimate, cordial and persevering co-operation has evolved the great work which is now the admiration of all.

Am I not, therefore, entitled to refer to my diffidence and emotion when all these thoughts are surging within me, and am I not entitled to your kind indulgence if I have somewhat strayed away from the subject of my discourse?

I hasten to return to it, and on behalf of the delegation of the French Government to the Twelfth International Navigation Congress, and in the name of the Frenchmen who have accompanied us, I address my warmest thanks to the Canadian Government for the cordial and enthusiastic welcome with which we have been received in this country.

I particularly thank the honourable members of the Government and my eminent neighbour, who have not hesitated, notwithstanding their important and high functions, to spare some of their time for us.

This, Gentlemen, is a proof of the interest which you have in the questions we have come here to discuss, an interest which has been manifested in the speeches which we have just heard; but it is also a mark of esteem and of honor which we all greatly appreciate, and the value of which we are well aware. I should have liked to express all our gratitude to the Minister of Customs for the facilities he has shown us in our entry into Canadian territory. By relieving us of all Customs facilities he has rendered us a service for which we are particularly grateful to him. I drink to the ever increasing prosperity of the Dominion, and from the bottom of my heart I wish that our French Canadians may continue to flourish under the British flag and show the world what they can do as good Frenchmen under such favourable conditions. (*Loud applause.*)

Lt.-Col. **H. A. Yorke**, delegate of Great Britain, then paid a tribute to the Members of the Canadian Society of Civil Engineers.

He expressed astonishment at the boldness, the capacity and the enterprise with which they had grappled and were grappling with the problems before them. Self-trust had ever been their characteristics. They had never been found wanting in the performance of their duty. He was glad to tell the gathering that in England they were proud to have the services of so many graduates of the Royal Military College, who were all doing honor to their native land.

After Colonel Yorke, Mr. **Elmer Corthell**, Member of the International Commission of Navigation Congress, then spoke on behalf of the United States as follows :

Mr. Chairman and friends, Canadian and delegates
of the Navigation Congress,

I wish to say, Mr. Chairman, at the outset that there has for many years been a comradeship and an interchange of membership between the engineers of our two countries and their Engineering Societies that has worked importantly for the welfare of both. Peterson, Fleming, Kennedy, Keifer and others of your good men have been and are active members of the American Society of Civil Engineers and many of us have been and are active members of the Canadian Society of Civil Engineers. Professionally in service for the two countries there has been also an interchange—we gave you van Horne and Hays and you gave us T. C. Clarke and Charles Macdonald.

I wish now to take this favourable opportunity, when so many leading men of your Government and of your Commerce are before me, to explain in some detail the operations of the International Navigation Congress. It is supported by the annual contributions of the Governments of forty-one countries, including the Danubian and Suez Canal Commissions.

The membership comprises 47 countries. Up to 1894 there had been held periodically two Congresses, one maritime navigation and one inland navigation. They might be called ephemeral, for they dissolved after the sessions of each congress, but in 1894 at the Hague the two Congresses met jointly and decided to constitute a permanent joint organization under the name of the "International Congress of Navigation", and to meet in 1898 at Brussels to perfect the permanent organization. The Belgian navigation and commercial men had taken a lively interest in the project and the Belgian Government was ready to support it.

The Congress of 1898 developed the project, which was perfected in Paris in 1900. Ever since 1900 efforts have been made on this side of the

water to bring the Congress to the United States, as this was desired by the membership everywhere. Circumstances beyond our control prevented. These circumstances were, first, the want of a suitable building at Washington in which to hold such a Congress. The Secretary of State, the late Mr. Hay, was of the opinion that we could not properly invite the nations of the world to send their delegates to such a congress until there should be erected a suitable building for such meetings and he recommended waiting until the proposed "Temple of Justice" should be built. Up to this time there is no such building in Washington and all existing structures are crowded with Government business.

Through the efforts of the Hon. J. Hampton Moore of Philadelphia, who introduced the Bill into the United States Congress, and by the powerful assistance of Mr. Alexander, Chairman of the Committee on Rivers and Harbors, the Bill was enacted into law. An appropriation of \$50,000 was made and foreign nations were invited. Philadelphia was selected as the place to hold the Congress of 1912. The municipality made an appropriation of \$50,000, the State of Pennsylvania appropriated \$25,000, and various cities, including Pittsburgh and the State of New Jersey, contributed funds for the excursions of the Congress. We have thus been able, not only by the money but by the real important generous service of the best people of these communities, to make the 1912 Congress a success. So much for the outline of its history. Let me now show you briefly how businesslike and effective is its word.

The Permanent International Commission, meeting at Brussels, selects the subjects to be reported upon two years in advance of the meeting of the Congress. These subjects have been previously suggested from the different countries and the Commission endeavours to select subjects of live interest and which have not been hitherto discussed and decided upon at previous Congresses.

The National Committee, members of the Permanent International Commission in the different countries, select the writers, one only for each subject, which are called "Questions", or "Communications". At the Philadelphia Congress there were three Questions and three Communications in each of the two sections, Inland and Maritime, and there were about 120 papers in all.

In the country where the Congress is to be held the committee of that country selects General Reporters, or Reviewers. When these preliminaries are arranged the subjects are written upon in each country, in papers not to exceed 20 pages, of 400 words each, and with a limited number of plates. They are sent to Brussels, where the Executive Committee of the Permanent Commission has them translated and printed in the three languages of the Congress—French, German and English. They are then sent out to the entire membership of over 2,000 scattered over the whole world. A set of each paper on each subject is given to the General Reporters, who write a synopsis of the papers submitted to them, and they at the end of

their reports give the consensus of opinion of the writers and close with suggested Conclusions for the Congress to adopt. These General Reports are sent on to Brussels, translated into the three languages and printed, with the suggested conclusions in italics. These are then sent out all over the world to the membership.

When the Congress assemblies later on it is unnecessary to read any papers, not even the résumé of the General Reporter—only his “Conclusions”, which are discussed in the Section meetings. They are adopted or changed or perfected, as the Section in the discussions decides to be necessary, and they are then voted upon by the whole Congress at its last general meeting of the Congress. There is issued each morning a “Journal” of the Congress, giving full information about the previous day’s work.

When the Congress adjourns, all the discussions, decisions and other information about the Congress are sent on to Brussels, where a volume of the proceedings is issued to supplement the papers already published. This volume is also printed in the three languages of the Congress and is then sent out to the entire membership.

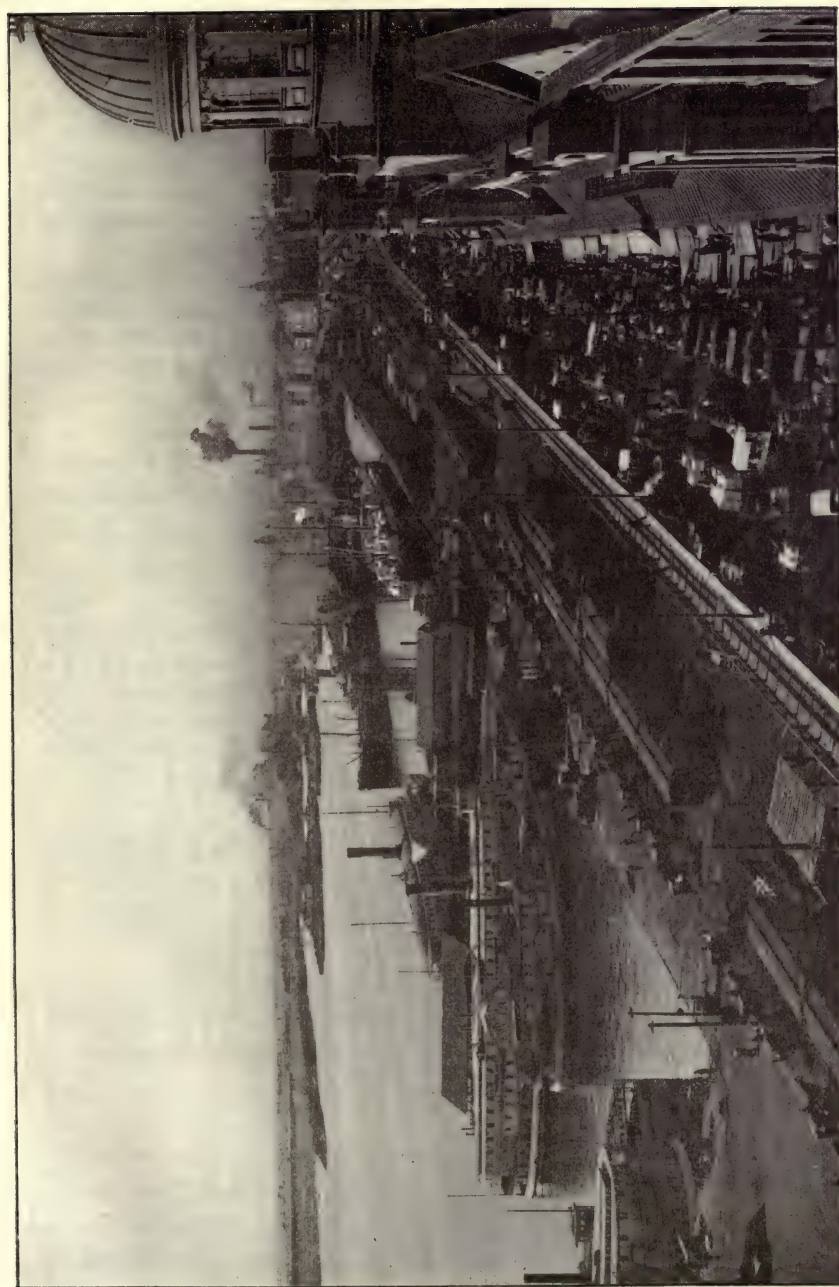
I think you will agree with me in the opinion that the results of such a Congress, its literary product, is of incalculable value to the navigation interests of the entire world, for the decisions of this Congress of practical experts have weight everywhere where Inland or Maritime Navigation works are to be built, operated or maintained.

There is no country in the world more interested in works of navigation than Canada, and it is because until now the real purposes and methods of the Congress have not been fully known or appreciated here that I have taken the opportunity to explain its work and its great importance to the navigation interests of this country.

As several of us are, on account of other engagements, soon to leave you, it is fitting that, speaking for the United States Government Board of the Congress, we should now express our great appreciation of the splendid management of this long Canadian excursion since we boarded your steamer at the Sault-Ste Marie. (*Applause.*)

We appreciate also that the arrangements had to be made as we proceeded, impromptu, as it were, which it was no small thing to do, by telephone and telegraph. We have been close enough to the three managers of this excursion, Col. Anderson, Prof. McLeod and Mr. Lamb, to know how arduous and how successful their labours have been. As they were supported so loyally by the Government and by the committees at all points visited, we appreciate the interest and the efforts made for the entertainment everywhere of the members of the Congress. We heartily thank you for it all. (*Applause.*)

Separating soon, as we must, to go our several ways, and you, my friends, delegates and members of the Congress, to your distant homes, we bid you farewell. We hope you will carry with you pleasant memories of this Twelfth International Congress of Navigation. We have done our



Richelieu & Ontario Navigation Co. Steamers at wharf, Montreal.

best, both in the United States and Canada, to make the Congress a success professionally, and the excursions and inspections pleasant and profitable. (*Applause.*)

We thank you heartily for coming to us. You have responded to our call, and we know you better than ever before in the history of our Navigation Congress, where we have met you at the Hague, Brussels, Paris, Dusseldorf, Milan and St. Petersburg. We hope in three years to meet you again and renew a most pleasant acquaintance and cement stronger the warm friendship between us. (*Applause.*)

These reunions of engineers of navigation works in different countries year by year, and especially the triennial Congresses, form friendship among the waterway engineers that work potently for the stability of the peace of the world and so perform a beneficent service to mankind. (*Loud applause.*)

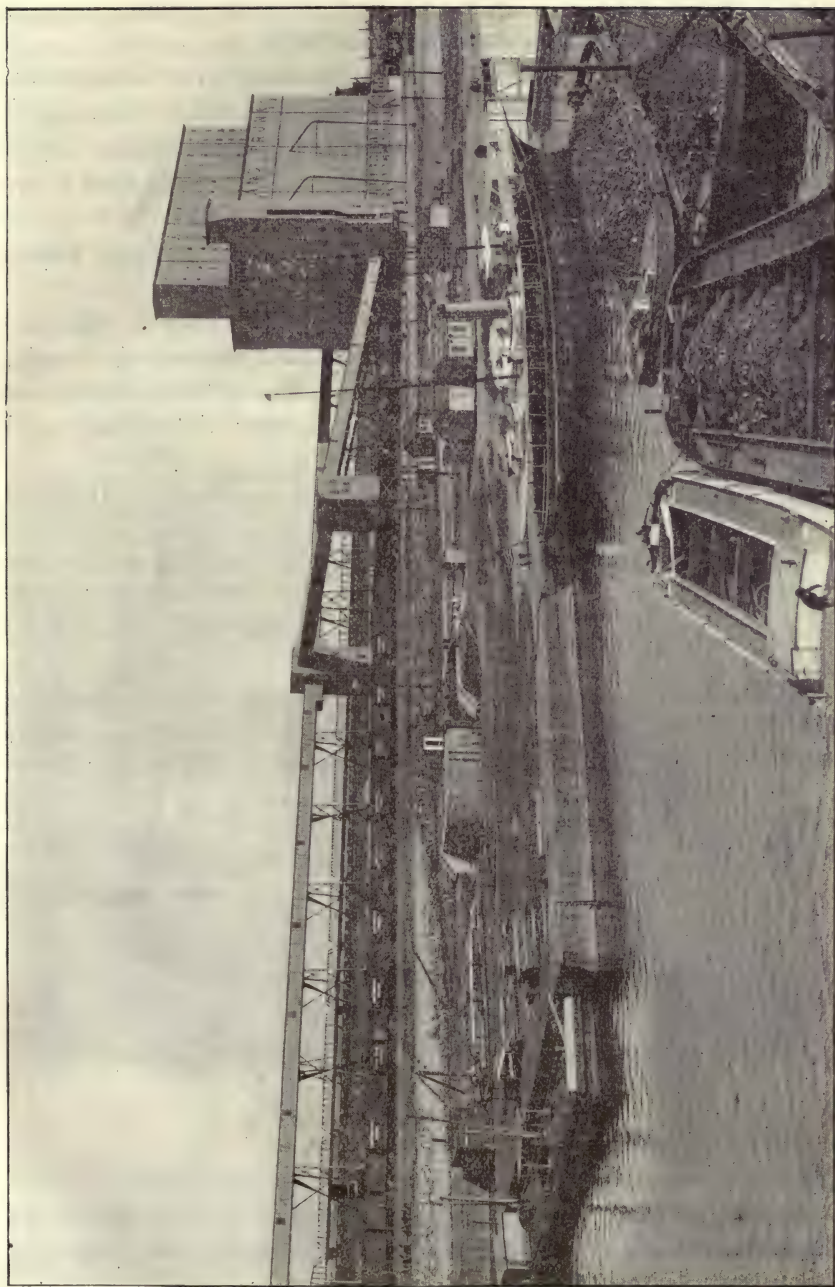
The Hon. **C. H. Perley**, Acting Premier, expressed his regret at the absence of Mr. Borden, but assured the delegates that he was heart and soul in sympathy with the desire that the Congress should meet in Ottawa.

This City of Ottawa, he said, was now getting to be called the Convention City, but it had never had so important an one as that would be. Such a Congress was a practical way of keeping the peace of the world. He hoped when they came to Canada, as he was sure they would, they would be able to see the whole country from the Atlantic to the Pacific. (*Loud applause.*)

The Hon. **F. D. Monk**, Minister of Public Works, also repeated the invitation to meet in Canada, and dwelt upon the loyalty of the French Canadians. His remarks in English were received with enthusiasm, as also those of the previous speakers.

The banquet then concluded. During the speeches the lady members of the Congress and prominent Canadian ladies, had come to add lustre to the banquet, after having been the guests of Mrs. Borden at a private dinner.

On the following morning June 16th the party were taken by special train to Coteau Landing, on the St. Lawrence River at the foot of Lake St. Francis and at the head of the Soulanges Canal, (14 miles in length) by which several rapids of the river, of which the more important are the Coteau and Cedar Rapids, are avoided



Grand Trunk Railway Elevators, Montreal.

by passenger steamers up-bound and by deep draught freight steamers both up-bound and down-bound.

Of the six canals, having an aggregate length of 45 $\frac{3}{4}$ miles, by which the rapids of the St. Lawrence River are avoided and a 14 foot depth of navigation afforded from Lake Ontario to Montreal, the Soulanges Canal is the fifth, numbering from Lake Ontario.

The locks on this system are 270 feet long, 45 feet wide with a depth of water of 14 feet on the sills.

At Coteau Landing a special steamer was in waiting and after the party boarded it proceeded down the river, through the rapids, to Lake St. Louis, where the Soulanges Canal terminates. The passage through the rapids was found very interesting and



Lachine Rapids, St-Lawrence River.

somewhat exciting. A stop was made at the foot of the canal to examine the lower lock, which is very close to the point where the canal enters the lake. The details of the operation of the lock were inspected and the French-speaking members were particularly

pleased to find that the language here commonly spoken was French. All of the villages along the shore of this part of the river and on the lower part of the railway route from Ottawa had a characteristic French appearance.

Proceeding through Lake St. Louis and past Lachine, at the head of the Lachine Canal, the steamer entered the Lachine rapids (the fall of the river from Lake St. Louis to Montreal is 45 feet), and passed under the bridge of the Canadian Pacific Railway. The Victoria Bridge at Montreal was soon afterwards passed and the steamer landed at the wharf at Montreal it then being early evening. On landing they were conducted to the Place Viger Hotel, in the lower French portion of the city, which hotel is owned by the Canadian Pacific Railway Co.

On the next day, June 17th, the party was taken on a drive to Mount Royal, from which a magnificent view of the city and surrounding country was obtained. The route, both outward and returning, afforded many interesting views of various sections of the city. The drive terminated at the harbor front where steamers were in waiting for an excursion around the harbor. This excursion gave an excellent opportunity for a thorough inspection of the shipping facilities of the harbor of Montreal. The important work in progress towards improving these facilities and the plans for future improvement work were fully explained by Major G. W. Stephens, Chairman of the Harbor Commission, and by his colleagues and assistants.

During the afternoon, members were, according to choice, taken either to the Angus Shops by street cars, or by automobile to various points of interest, provision having been made for all persons who desired to visit the Universities or other places in which they were specially interested.

Banquet at the Montreal Club.

This banquet was given by the members of the Harbor Commissioners to the members of the Congress. It was presided over by Major Stephens, Chairman of that Commission, and many of the most prominent citizens of Montreal had been invited.

Mr. Monk, Minister of Public Works, also honored the banquet by his presence. Several speeches were made at the end of the repast.

After the toast of The King, which was much applauded, the Hon. Mr. Monk, then rose, and was enthusiastically acclaimed.

He proposed the health of the guests.

The Department of Public Works of Canada, he said, were very busy with many important works, but they had felt that it was important, notwithstanding the call upon their time, to be present at this banquet to welcome their distinguished guests. The Congress first met at Brussels. What progress it had made since then! From humble beginnings it had now become a great agency of civilisation. The problems they studied were not only of technical interest, but were such that in solving them progress was made in the welfare of mankind at large, and it was reasonably hoped that the effect of their work would be even greater in future. The Dominion Government felt it an honor to have the delegates come to see the undeveloped and to many still mysterious resources of a country that in area was one of the greatest in the world. The proceedings of the Congress had been followed with great interest by the Government, and many benefits must inevitably result from its deliberations. They were interested in all that scientific men could do for the development of the boundless resources of that country. (*Applause.*)

When the Panama Canal was opened great extensions would take place, especially on the Pacific coast where Vancouver and Victoria were developing in a way that was taxing the present resources of the Government, and the Government also hoped this year to extend the dry docks of Quebec province and of other parts of the country. It was also important to husband the water power of the country, which was equivalent to over 70 million H.P.

In concluding his remarks the Minister expressed the hope, as he had already done at Ottawa, that a future Congress would be held in the Canadian Capital.

Judge **Archibald** then spoke as follows, (in English) :

Mr. Chairman,

I thank you heartily for the honor you have done to the Bench of the Province in asking one of its Members to propose this most important coast to welcome the members of the Permanent International Association of Navigation Congresses.

I regret that, through the sad circumstances of family bereavement, it has been impossible for the natural representative of the Bench, Chief

Justice Davidson, to be present with you to-night and to perform this pleasing function. I feel highly honored that, in his absence, the duty has fallen to me.

Although the administration of Justice is not, at first sight, intimately connected with the interests of navigation, yet I think this toast has been very properly confided to a member of the Bench.

We take no interest in partisan politics, yet I hope we are as keenly alive to those great policies which concern the welfare and progress of the country as any member of the community. (*Applause.*)

It is, moreover, a great advantage to us to come in touch with those great movements which transcend party, and even national politics, and embrace the general interests of humanity. It is for that reason that I feel that a member of the Bench is in his right place on this occasion.

The work of the Association which we honor to-night embraces the interests of navigation throughout the whole civilized world. It is represented by delegates from a very great number of maritime nations. I think I am right in saying almost forty. It is wholly free from national and local considerations. The interests of world transport constitute its sole objective. It has just held its congress in the City of Philadelphia, upon the invitation of the United States. It has the support and approbation of all civilized nations. Its members are chosen, in each nation, from those principally eminent in all matters concerning navigation. It is thus capable of rendering the highest possible service in the solution of all those questions which concern the economical expeditions and safe transport of passengers and freight, by water, from point to point throughout the world.

It is concerned with the problems of inland navigation as well as with those which relate to ocean navigation. It has already, in the twelve congresses which it has held, performed highly valuable services, and more than justified the enthusiasm with which we welcome its members here to-night. (*Applause.*)

I think, Sir, that we have a right to congratulate ourselves that so many members of this Congress, have been able to avail themselves of the opportunity of visiting Canada. We have here most important problems, for the solution of which I think it will be conceded that we need the highest knowledge of navigation matters which it is possible to obtain.

I am glad, Mr. Chairman, that you have been able to show to our visitors the immense progress which has been made in recent years in the equipment and establishment of terminal facilities in the Port of Montreal. I am tempted to say some words in praise of the energy, industry and foresight of the Board of Harbor Commissioners of Montreal, and of yourself, Mr. Chairman, as its President, which have transformed in a comparatively few years the Port of Montreal, so far as its terminal facilities are concerned, from a comparatively low state of efficiency to one of which you and the citizens generally may be proud. (*Applause.*)

And, perhaps, as far as you personally are concerned, I could properly do so, because, although you are presiding here to-night as Chairman

of the Harbor Commissioners of Montreal, to honor our visiting guests, you are also a member of the Association which we honor, and you may be sure that when we rise to pledge this toast, you will stand in our thoughts prominently among our guests as a sharer of our admiration and regard.

I had the pleasure, Sir, of reading sometime ago a most exhaustive and valuable report made by yourself of a visit to all the chief maritime ports of the world, from which you have been able to form conclusions and adopt measures highly to the advantage of the Port of Montreal. And I have no doubt, Sir, that under your guidance, and with the ability and foresight of your colleagues, this port will continue to advance in a manner to keep pace with the most progressive ports in other parts of the world.

We have very great problems of navigation which may well interest the Congress whose members we are now honoring. I hope I may be pardoned, as a mere layman, if I venture to suggest certain proposals, which I might be tempted to describe as romantic, but which have, nevertheless, created great interest and attracted much support during late years. I refer to the canalization of the Ottawa River so as to join the great lakes, by way of the Georgian Bay, with the City of Montreal and ocean navigation; and that other proposal, still more daring, to create a trade route from the immense grainproducing areas of the Northwest, by the way of Hudson's Bay and Straits, among the whales and walruses of the Arctic, to the markets of Europe.

I think every one will acknowledge that we have, during our whole development, been favored with a government intelligently sympathizing with the interests of navigation. The creation of the system of canals which we now possess, with a depth of fourteen feet from Montreal, head of ocean navigation, to and through the great lakes, is, in itself, no small tribute to the confidence of this country in its future development, and its willingness to bear the sacrifices necessary to procure it. Then when we look at the history of the Port of Montreal and the navigation of the St. Lawrence to the sea, we find one continuous record of improvement and advance, planned and executed by successive Boards of Harbor Commissioners with the sympathy and aid of successive Governments, until we have now the terminals you have to-day inspected and a safe channel of 30 feet to the ocean.

I apologize for blowing the horn a little as to our achievements. I assume that the objects you have in view are independent of national considerations, and that the immense possibilities of our great inland waterways, rivers, canals and lakes, (I might say, inland seas) cannot fail to attract your serious attention, with the view of determining, not how they may be made of special benefit to us, but how far they can be utilised to advance the economy and efficiency of world transportation. It may doubtless be possible for you to devise some means by which the dangers of navigation arising from the presence of ice in our trade routes, especially those more northern and short routes reached by the St. Lawrence,

or the Hudson's Bay, may be, if not eliminated, at least greatly diminished, and that this result may be reached without adopting what I may call panic remedies, taken under the influence of some great disaster, and which might have the effect of greatly diminishing economical navigation, and thus necessarily adding to the price charged to the consumer for the merchandise carried.

I am sure that, by this visit of the members of the International Congress to this City, many of these problems will attract their attention, and that we shall, in consequence, receive the best expert aid in solving the difficulties which they present. (*Applause.*)

But, Sir, I think it is not only the material advantages of the work of this organization that are to be the measure of its actual importance in the world. We hear in the newspapers, from time to time, and in speeches of prominent politicians, matters which keep us somewhat in alarm as to the probability or possibility of great wars. Nations appear to be, more or less, in an attitude of suspicion against each other. This attitude is, I am sure, largely fostered by want of knowledge, on the part of the Government and people of one nation, as to the policy and intentions of its neighbours.

In my judgment, Sir, there could scarcely be a more powerful agency towards the removal of such feelings of suspicion and distrust than the work this organization is adapted to accomplish. It is, as I said before, composed of the representatives of all civilized nations. It proposes to influence the navigation laws of all nations. It cannot fail to exercise a powerful tendency towards harmonizing and unifying such laws. The subject of international transport is becoming more and more, essential to international progress. The power and influence of transportation, and especially of water transportation, is becoming more and more, an essential element in international relations.

Not only navigation, but business and commerce of every description are essentially peacemaking. It does not seem to be a very improbable hope that the time may come when commercial and navigation interests may be too strong for any influences which make for war. Personally, I have more confidence in the efficiency and power of the merchant marine than I have in the multiplication of Dreadnoughts.

This Association has, since its organisation, grown in power and influence, and I think it ought to be and it is the warm hope of all the members of the community, and especially of those interested in commerce, that its progress and influence should increase until, working in connection with other influences tending towards the peaceable solution of national difficulties, the time shall come when war shall be no more. (*Applause.*)

I fear, Sir, that I may have pitched my remarks in too grave a key to suit this festive occasion, but I have been so penetrated with the commanding importance of the operations of the Association represented by our guests, that I have not been able to do otherwise. It is fortunate that, on occasions of this kind, the representatives of all nations can see eye

to eye and work shoulder to shoulder to advance our great and common objects, without too much regarding the partial and somewhat narrow views of our politicians. And why should it not be so? What a boundless amount of common property you have—the mighty ocean, the universal highway; the infinite bond of common interest in commercial exchanges, mutually increasing the wealth and comfort of humanity at large. Are not these aims and achievements sufficient to fill all our hearts? (*Loud applause.*)

I beg you, Gentlemen, to fill your glasses and drink with warmest enthusiasm to the health of the Members of the Permanent International Association of Navigation Congresses, and to the hope that their great designs may rapidly increase in power and influence, and not only contribute to the best interests of navigation, but also bring about a much more intimate knowledge and sympathy between the nations of the world.

Thanking you, Mr. Chairman, on behalf of the Bench... (*Loud applause.*)

After Mr. Archibald, Mr. **Robidoux** then welcomed the members of the Congress.

He did this in well chosen terms, and reminded them of a recent visit to Canada of Messrs. Hanotau and Barthou of France, a memorable visit which left a souvenir not easily to be effaced.

Mr. **Chargueraud**, first delegate of France, was the first to respond to the toast in the following terms, (in French).

Your Excellency and gentlemen,

The night before last at Ottawa when I spoke at the dinner which was given by the Canadian Government, I explained and justified the intense emotion which I then felt. Your Excellency at the time fully appreciated it, and the reply that you were then good enough to make to us and your words just now are for me, as for my compatriots, a proof of that esteem, sympathy and cordiality for which we are so deeply grateful. (*Applause.*) I am glad of this occasion to publicly acknowledge our indebtedness to you, but if I had to-night to keep to this ground, and express the sentiments I feel after the welcome we have received on all hands, after the visits which I have made to charitable institutions and educational institutes and to the port works, I should find it extremely difficult to express myself suitably. (*Applause.*) I would risk not confining myself to the limits which are assigned by the international nature of this meeting.

The speech of the honorable Mr. Robidoux has shown us that Montreal still resounds with the words which were pronounced here a short time since by two of my eminent compatriots, Messrs. Hanotau and Barthou. I had the honor of working intimately with Mr. Barthou for over three

years when he was Minister of Public Works, and I am not surprised that his magnificent eloquence, his warm and vibrant words, and his charm should have left imperishable traces here. You will, therefore, allow me to take my rank behind these eminent personages, and limit myself to seconding their remarks. (*Applause.*)

One more word; but it comes from the bottom of my heart. Thanks for your welcome here. Thanks for your charming hospitality. Thanks for all the trouble you have taken and for all the fine and instructive things that you have shown us. (*Applause.*)

We have been astounded by the industrial and commercial development of your fine country, whose port of Montreal will be one of its jewels. I am one of those who think that if the Nineteenth century has been the century of the United States, the Twentieth Century belongs to Canada.

Gentlemen, I raise my glass to the prosperity of Canada and to the Port of Montreal. (*Loud applause.*)

Mr. **Lusensky**, of Germany, and Mr. **de Roummel** of Russia, Dr. **Ritter** of Switzerland and Lt-Col. **Yorke** of England then spoke and all returned thanks on behalf of their respective countries for the magnificent reception which had been vouchsafed to them in Canada.

Alderman **Leslie Boyd**, then praised the Harbor Commissioners of Montreal, and its President Major Stephens.

Major **C. W. Stephens**, then addressed the delegates of the International Navigation Congress in the following terms, (in English):

Gentlemen :

We welcome here tonight perhaps the most distinguished group of foreign visitors that has ever done us the honor of coming into our midst, gentlemen from the four corners of the earth—descendants of those who through all ages have been torchbearers of civilisation.

We welcome you to Canada's chief city, the commercial capital of a young country, the second seaport in America.

You have come to us by a circuitous route, through that great back door of Canada the portals of which stretch for 3,000 miles, between two peoples, unmarred by the frown of fortress or battery, where the voice of the sentry is still, where the doors are always open; the keys having been lost in a hundred years of harmony and mutual respect.

Called together as delegates to the Twelfth Congress of Navigation in the City of Philadelphia, you have been received in the cradle of democracy with royal splendor, you have tasted deeply of a hospitality that is prodigal and you have stood in amazement, no doubt, at the stupendous industrial

profligacy of a nation that has gathered to herself one hundred millions of people in a single century.

Leaving the brilliancy of the achievement in the background you have come to a younger and more modest country; where abides the eldest daughter of the British Empire—Canada, occupying as she does the northern half of this continent—slightly the larger half be it not forgotten—though possessing as yet less than one-tenth of the population of her big brother the United States. What have you seen in Canada and what are your impressions?

You have seen here in Canada the descendants of two great peoples—living happily side by side, emulated by an unselfish and generous rivalry, who nevertheless have shown to the world that the path of ambition has not become so narrow that two cannot walk it abreast. You have briefly examined our great inland navigation system which with the St. Lawrence River, Canals and Great Lakes, give us the deepest and largest water routes in North America. You have perhaps, remarked that this great water system put across the map of Europe would reach the Ural Mountains in Asia; give it to South Africa and it will cut in two that continent at the Equator, joining together the Atlantic and India Oceans; give it to South America, and it will rival the great Amazon, stretching from British Guiana to Buenos Ayres; give it to the United States and it will stretch from New York to Salt Lake City.

You have examined our railway system and found out that Canada is the only country in North America which possesses a Transcontinental Railway spanning the Continent, owned and directed by a single management; you have found out further that two more Transcontinental Railways are in progress, so that by 1915 when the great Panama Canal opens its gates, Canada will have three Transcontinental Railways feeding the sea-ports of both oceans.

You have been interested in the Port of Montreal, one of Canada's National sea terminals, the furthest inland sea port in the world, with 1,000 miles of river leading to the ocean on one side of her, and 1250 miles of inland navigation leading to the heart of a continent on the other side. The Port of Montreal is owned by the people of Canada, financed from the National Treasury and administered by three national trustees appointed by the Federal Government. This is one of the few examples of public ownership in North America where usually the good things are found out by the corporations and trusts before the people have awakened to the realisation of their value. For 16 miles on either side of the river, this jurisdiction extends and this port is approached by a buoyed and lighted channel, the minimum low water depth of which is 30 ft.; soon to be dredged to 35 ft. There is no tide, and ships of 15,000 tons dock day or night.

You have seen at work in the Port of Montreal the largest transfer elevator system for grain, yet assembled at any one point, with its grain storing capacity of 5,000,000 bushels and its landing capacity of 2,000,000 bushels per day, carrying the golden grain from the central storehouses

to each ship at her own berth. You have seen a sea port, to whose docks and piers, cars of every railway in the country have easy access, where the cargoes are landed and unloaded without the use of expensive machinery; a port where no tonnage dues are charged against the ship, where the revenues are secured by moderate rentals for space occupied and rates on goods passing to and fro over the wharves. Yet this infant port, just starting, is doing a volume of business exceeding that of any other port in North America, except New York. In your brief visit to this country you have no doubt seen enough to create the impression that at any rate Canadians are heirs to a great legacy; a country of vast dimensions, natural wealth and wonderful resources, enough perhaps to turn the head of many an older country. Nature has made this a country of big things, our rivers, mountains, mines, forests, agriculture, commerce, our outlook, our language, our hopes, all show signs of being planned in keeping with the dimensions of a big country with a big future. While this is true, let me assure you that we are not forgetful of what the older countries have done for the advancement of the world, and how much we owe to them for what we have and enjoy. (*Applause.*)

What Great Britain has done in the cause of commerce and navigation; what the imaginative genius of France has achieved in engineering, architecture and art; what Germany has done in the construction of newer and higher standards of organisation and investigation; what Italy has done through her great artistic and inventive minds; what Russia has done for constructive engineering; what Norway, Sweden and Denmark have accomplished; what Switzerland has modelled for the world in her exemplary government, all these things we remember. We want you, therefore, to feel that you have come in contact with a young, vigorous and determined people sprung from the loins of the foremost nations in the world, who, while proud of their inheritance, are mindful of what they owe the older countries from which you come, to their forefathers who ploughed the way and held the beacons high in days when hardship, poverty and privation were constant companions.

(continuing in French):

We are happy to be able to render homage to France to which Mr. Gabriel Hanotaux so graciously referred the other day during his first visit here.

Among other things he told us that France was rich because she had discovered the secret of "small tonnages and small profits."

Allow me to tell you that France is rich because the love of their country is in the hearts of all her citizens, and we Canadians will also be rich if the same sentiment exists in our hearts.

(continuing in German):

It is a great joy to me to be able to welcome the Germans who have come here from their Fatherland. (*Applause.*)

I had the honor of spending a few months in their country some years ago.

I learnt a little German, and also the language of fraternal love, which I have never forgotten.

I associate myself with the words which I heard there,— “We Germans fear God, but nothing else in the world!” (*Applause.*)

(resuming in English):

Canadians realize that the future of their young country, honoured this day by the visit of so many distinguished men, depends not in her mines, nor in her forests, not in her wheat fields, but in the hearts and minds of her people, the integrity of her men and women, who say—“We Canadians fear God but nobody else in the world.” (*Applause.*)

I am quite sure that our old world guests, who tonight delight us with their presence, will never cease to be proud of the fact that the great names of which they are the honoured representatives, are inscribed upon some of the most splendid pages of the New World’s history, and will live forever in the grateful affections of the New World’s heart. (*Loud applause.*)

Lieut. Col. **Wm. P. Anderson**, delegate of Canada was the last to speak and thank the organizers of the excursions. He proposed the toast of the “Press”, in English, as follows :

Mr. Chairman and gentlemen,

This sudden call on me to propose a toast gives me the opportunity of drawing attention to one or two points in connection with our visit to Canada and Montreal that I think should be noticed before we part.

I have been glad to hear the expression of opinion by the Honorable Minister of Public Works, representing the Government, of the advantage to be gained by Canadian engineers participating in the deliberations and inspections of our Congress, but I would remind the Government through him that enduring good can only be attained by having Canada’s representation a continuous and influential one. It takes a man one Congress to become acquainted with his colleagues and with the modes of procedure, and unless the representation is continuous, much of a country’s influence is lost.

Since the present Congress completed its clerical labours, we have been travelling through the eastern part of the United States and Canada, inspecting waterways, canals, aids to navigation, and pending problems, during which time our overseas members have seen something of what engineers on this continent have done and are projecting in improving our waterways, and something of those magnificent fresh water seas which we and the United States jointly use and control, and I am sure they

appreciate both our successes and the difficulties which, in a new and undeveloped country, raise problems very different from those that confront engineers in older and more thickly populated centres. In helping the Canadian Government to conduct the party over the last part of our trip, and in making it the success which those who responded to "Our Guests" assure us it has been, I desire to seize this, the last occasion on which we shall all be gathered together, to express the thanks of the Government of Canada to the Canadian Society of Civil Engineers for their assistance, and I would specially name Mr. Ross, of Sault Ste Marie, Mr. Irving of Toronto, Mr. Chapleau, of Ottawa, Mr. Lamb, of Windsor, and Mr. Morkill, of Sherbrooke, the last two having accompanied us, all the members of the Montreal Committee, who organized our trips of to-day, but above all Professor McLeod, Secretary, of the Canadian Society of Civil Engineers, whose indefatigable work in organizing the Canadian trip and attending to the innumerable details, is beyond any praise I am competent to give (*Applause.*)

But there is another and most important influence to which we must attribute a great measure of the success of the Congress. A body such as this can be of no material use without publicity, and we have been generously treated by the public press throughout our official discussions and subsequent wanderings. It is true that on one or two occasions their comments were embarrassing to individual members, and some of the less lovely of us consider that we have been vilely caricatured, but these are mere episodes; we are really cognizant of the work of the newspaper press of Canada and the United States in drawing public attention to our worthy objects, and are grateful to them for their aid. It is our hope that the press of Montreal, which upholds a high standard of probity and intelligence, will continue to grow with the expansion of this great country and city, and I give you, with all my heart, the toast "The Press". (*Loud applause.*)

This concluded the banquet, though several of the members remained in the Club a short time longer with their Canadian colleagues, and only separated at a late hour.

During this day of June 17th a special program for the ladies accompanying the members had been arranged. It consisted of a drive on Mount Royal, similar to that taken by the men in the morning. At 1 P. M. a luncheon was offered by the ladies committee at the Windsor Hotel (in the English speaking portion of Montreal). From 3 to 6 P. M. the ladies were taken on an automobile tour through the city and to the Forest and Stream Club, located on the St. Lawrence River several miles above the city, where a dinner was served.



Tug "Lady Grey".

On the following day, June 18th, the party boarded the Government steamers "Lady Grey" and "Sir Hugh Allan", which left for Quebec. Major Stephens and several other gentlemen connected with the Montreal Harbor Commission or with the Department of Marine & Fisheries, accompanied the steamers and explained in detail the work in progress and proposed on the ship channel from Montreal to the mouth of the St. Lawrence. The following is a brief description of this work, showing the progress made to the close of 1911 :

The ship channel of the River St. Lawrence between Montreal and Father Point, 180 miles below Quebec, has a total length of 340 statute miles. The contracted part of the river, which may properly be called the "Ship Channel", commences at the Traverse, to which point from Montreal, the distance is 220 miles.

The project for a 30 foot channel between Montreal and Quebec was adopted in 1889, while the improvements below Quebec were decided upon in 1906.

The project for the channel between Montreal and Quebec

had in view a channel of 30 feet depth, at the extreme low water of 1897, from Montreal to tidal water at Batiscan, and from Batiscan to Quebec at extreme low tide. The width contemplated was a minimum of 450 feet in the straight portions, and from 550 to 750 feet at the bends. An anchorage was to be provided at White Buoy Curve, Lake St. Peter, of 800 feet in width.

The 30 foot channel is now completed to the upper end of Cap à la Roche channel, a distance of 107 1/2 miles from Montreal. The anchorage basin in Lake St. Peter has also been completed.

During the summer of 1911 most of the Cap Charles Channel widening was completed to 450 feet.



At 15,000 ton steamer going up the Ship Channel near Montreal.

The length of the 30 foot channel actually completed at the close of navigation for the season of 1911, equals 60.60 statute miles, total length requiring dredging being 63.35 miles, there remaining 2.75 miles yet to be done.

Cap à la Roche will probably take about two more years to complete, while the remainder to Quebec should be completed in about one year longer.

The project of the work below Quebec, had in view a 30 foot channel at low tide at St. Thomas Flats and at Beaujeu Bank. The Beaujeu Bank channel was completed in 1910 to a depth of

30 feet at extreme low tide and to 1000 feet in width. The St. Thomas channel was completed to a depth of 30 feet at extreme low tide and to a width of 1000 feet, at the end of the season of 1911, and will be opened for navigation during the season of 1912.

Some progress was made on the 35 foot channel between Montreal and Quebec. A distance of 6.07 miles has been completed up to the end of the season of navigation of 1911.

A good start was made on the North Channel below Quebec, with the two suction dredgers "Galveston" and "Beaujeu". It has been decided to deepen this channel to 35 feet at extreme low tide with a width of 1000 feet.

The total cost from 1851 to the close of the fiscal year, of the ship channel, including plant, shops, surveys, etc., is as follows:

Dredging	\$ 8,947,029.83
Plant, shops, surveys, etc.	5,577,525.68
<hr/>	
Total	\$ 14,524,555.51

The number of cubic yards dredged amounted to 78,231,531, the material varying from very hard shale rock to soft blue clay. As an addendum to this description it may be stated that for the 35 foot channel it was estimated that 61,939,100 cubic yards would have to be removed, the number of miles to be dredged being 82.24. This work had been approximately one-seventh completed on June 17, 1912.

The two boats conveying the members of the Congress stopped at Lake St. Pierre to enable them to visit one of the great dredgers which is deepening the channel to 35 ft. Another stop below Lake St. Pierre enabled the excursionists to get aboard a hydraulic dredger which was removing schistous rock without explosives.

The party arrived at Quebec rather late in the evening, and were taken to the Hotel Chateau Frontenac, where quarters had been provided for them. The Chateau Frontenac, built on an admirable site, is the largest and most superb hotel in Quebec.

The day of June 19th was devoted by a certain number of the members to visiting the new bridge at Quebec now in course of construction, which is located several miles above the city. This



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bridge for railways purposes crosses the river at a site which is remarkable on account of the narrowness of the stream here, as compared with its usual width.



Shale Rock dredged, without the aid of explosives,
St. Lawrence River.

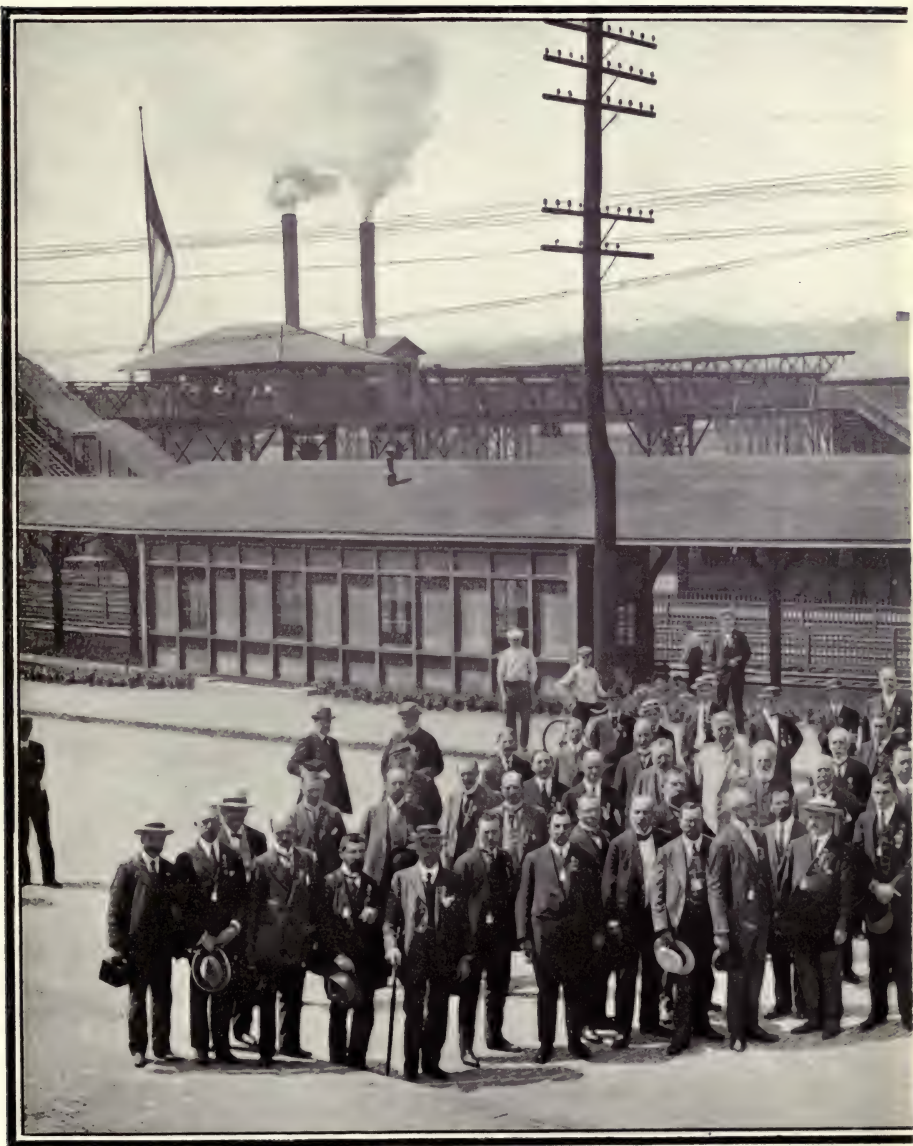
Other members of the wandered either by themselves or under the guidance of the Canadian Committee about the city, which is extremely quaint and interesting. Most of the party then left Quebec in the afternoon or the evening, en route for New York.

This day terminated the Canadian excursion, which was one of the most enjoyable trips connected with the twelfth Congress. The members taking part in it had visited the three largest cities in the country; Montreal, Ottawa and Toronto; and its oldest and most picturesque city, Quebec. On this trip, and on the trip which they had taken from Philadelphia to Saulte St. Marie, they had seen a considerable part of the remarkable navigable waterway formed by the River St. Lawrence, and the great lakes and their connecting channels, this waterway having a total length from the Straits to Belle Isle to Duluth, of 2,357 miles. They had been most cordially

received by the Government of the Dominion, some of whose highest officials had asked that an International Congress of Navigation might soon be held in Canada.

The Canadian Committee and the various local Committees had made great and very successful efforts to entertain the foreign members.

It was felt by all that the Canadian trip had been a most desirable, useful and interesting supplement to the trips in the United States.



TO THE AMERICAN



ON

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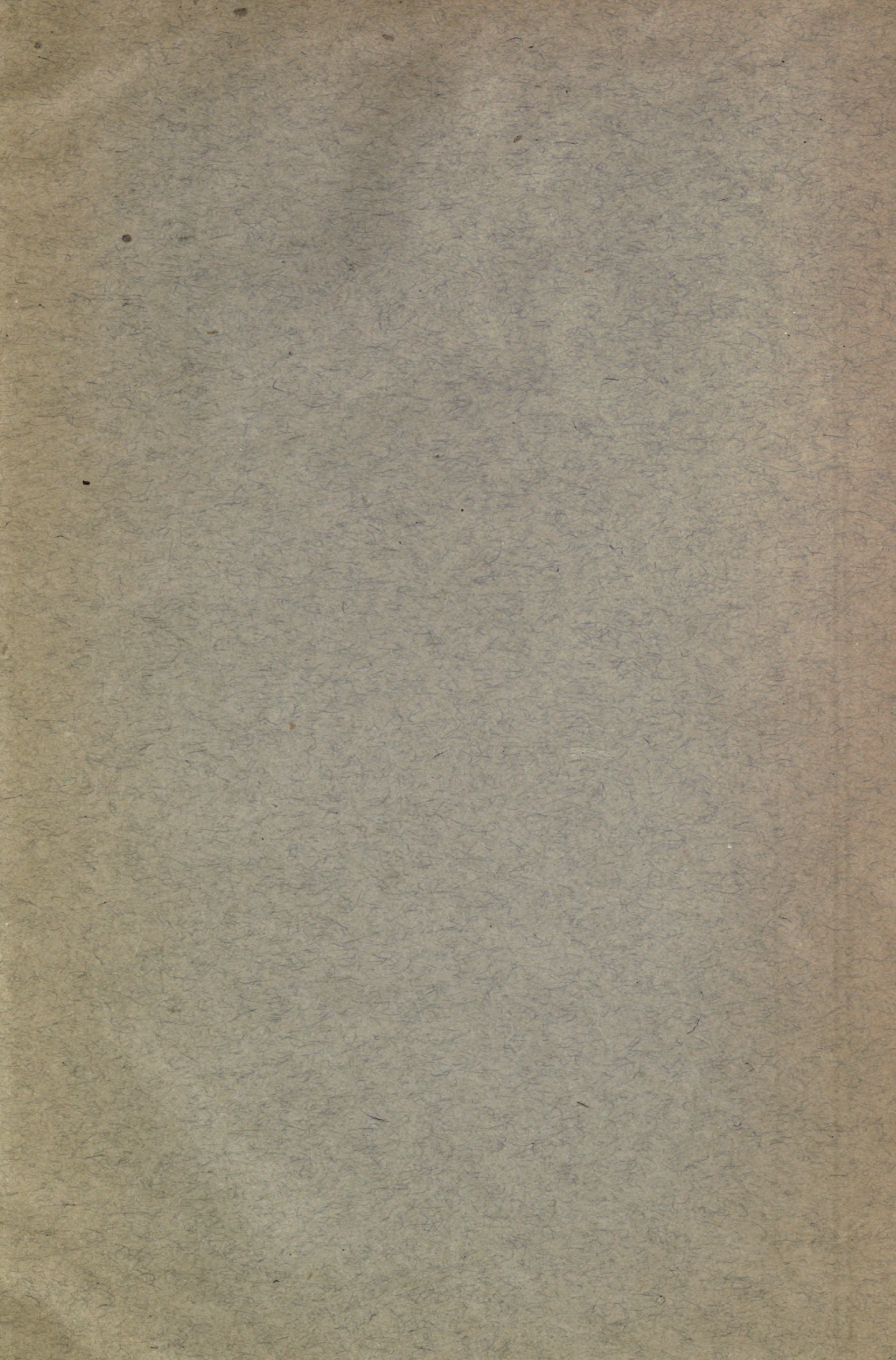
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